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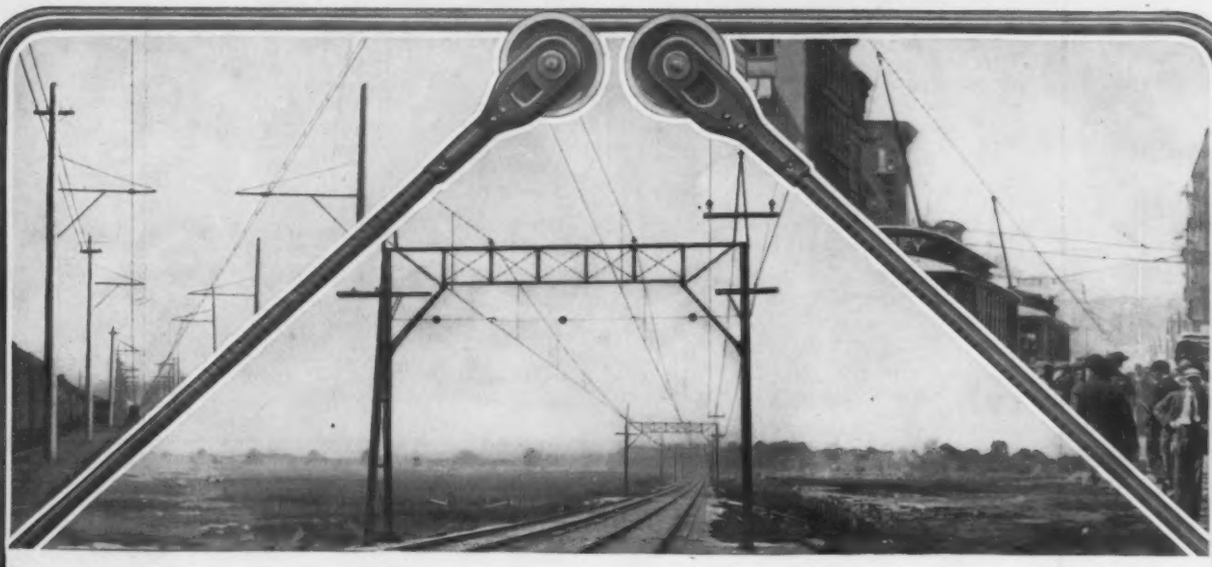

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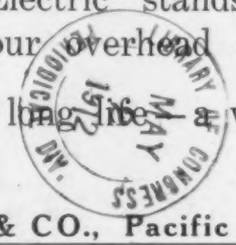

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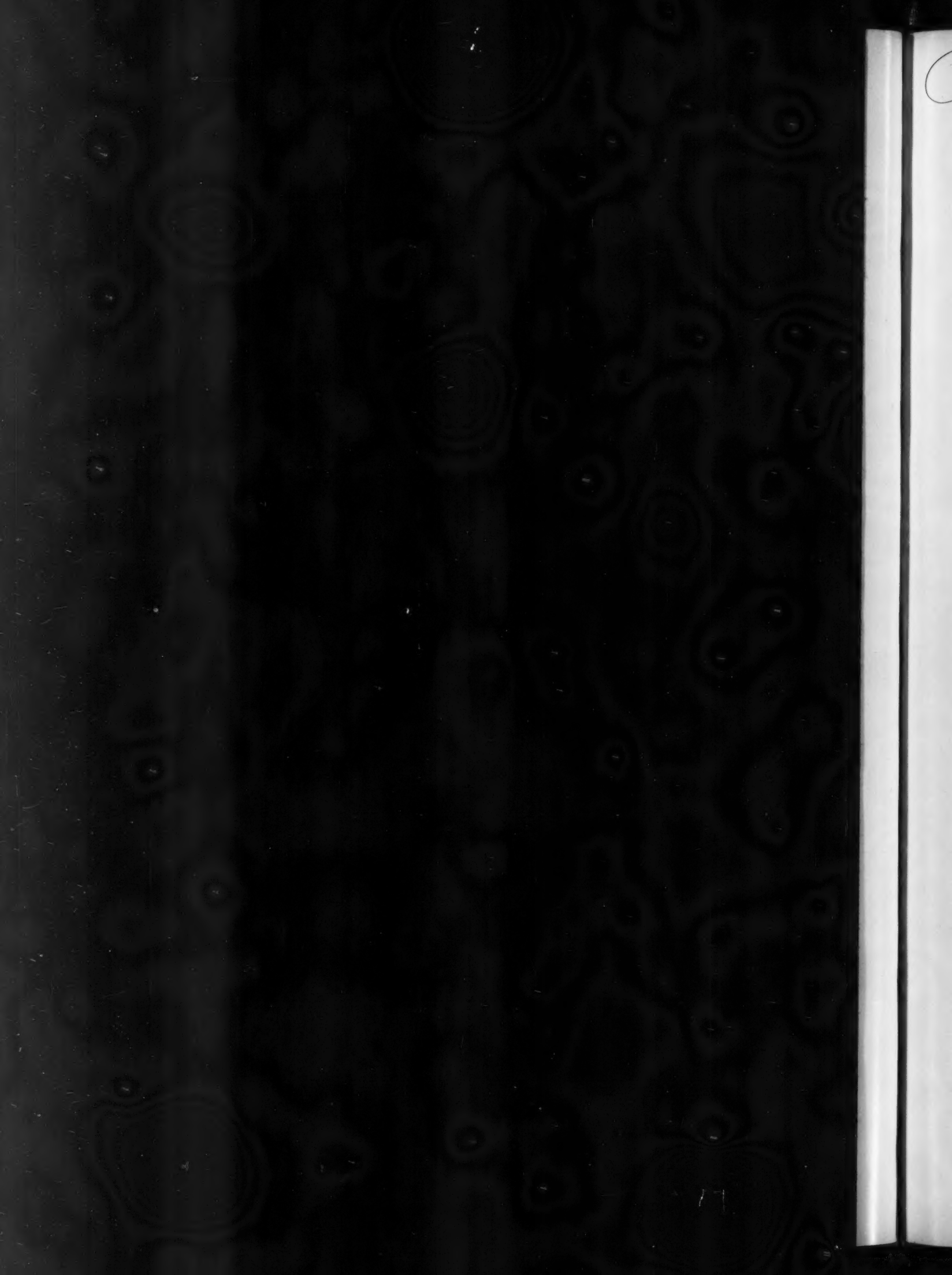

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POWER AND GAS
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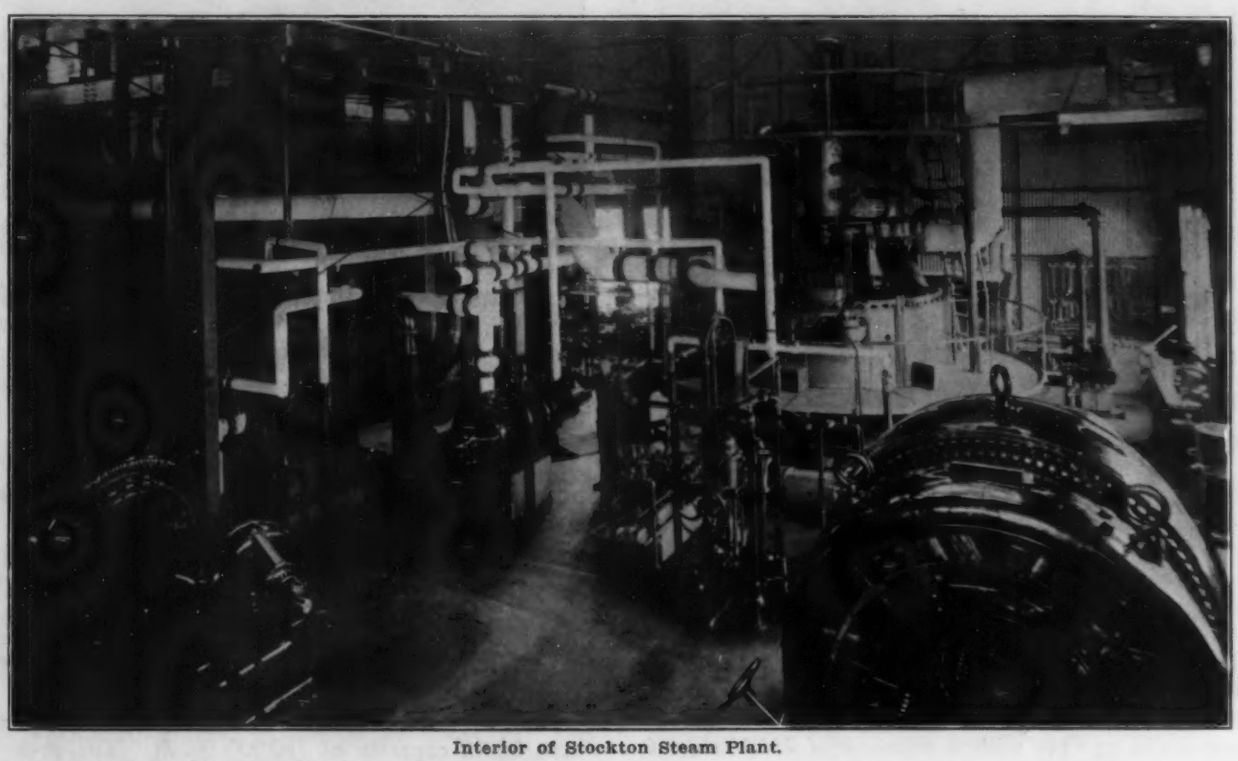
WESTERN STATES GAS & ELECTRIC CO. AT STOCKTON

BY ROBERT SIBLEY.

The City of Stockton, one of the oldest municipalities in the great commonwealth of California, has had an interesting history. The development of the public service corporations, supplying heat and light to its citizens, composes no insignificant part of the life of this city.

In 1905 the American River Electric Company came into Stockton, having installed an hydroelectric plant on the American River about seven miles to the northeast of Placerville. In addition to this hydroelectric plant, with its 3000 kw. installed output, that company also built a steam plant in Stockton. This



Interior of Stockton Steam Plant.

Natural gas was discovered in the underlying strata in and about Stockton some forty-five years ago. In 1887 the corporation at that time controlling the supply of natural gas in and around Stockton, also went into the electrical business under the name of the Stockton Gas, Light & Heat Company. This corporation existed until 1904 when the Stockton Gas & Electric Corporation was organized, which absorbed the old holdings of the Stockton Gas, Light & Heat Company and also purchased additional natural gas wells in and about Stockton.

steam auxiliary was installed in 1907 and the 1500 kw. vertical turbine at that time installed was the second to be shipped to California.

In 1910 the controlling interest in the American River Electric Company and the Stockton Gas & Electric Corporation was taken over by the H. M. Byllesby Company of Chicago. This company reorganized the separate holdings under one head and called the combined interests the Western States Gas & Electric Company. The early days of the gas and electric business in Stockton were fraught with many

dissensions and much unfavorable public opinion. In the following lines will be found a detailed description of the present holdings of the Western States Gas & Electric Company, which today are held in remarkably high public favor, for deep appreciation is felt over the broad ideals which have been instituted under the new management of the past year and a half.

Gas Plant Data.

Twelve natural gas wells are owned by the company. These wells have an output of 330,000 cu. ft. for every twenty-four hours, and, in addition to this there is manufactured at Station A of the company 300,000 cu. ft. of oil gas.

Gas well No. 8 presents an interesting picture. This well was started on November 10, 1904, and at one time was abandoned but today it is being sunk to a depth of over 2800 feet and, from the blue shale indications now being uncovered, the 8¼ in. casing of this well

Gas Well No. 8.

will soon again be pouring out its blessing of natural flow of gas.

The gas plant, which is known as Station A, is being overhauled and within the next month or two will be equipped with modern devices in every particular. The new plant will contain the two old generators, reset with a capacity of 300,000 cu. ft. per twenty hours each, and, in addition, there is being installed a new Jones gas set with a capacity of 750,000 cu. ft. per twenty hours run. A place is being left in this building for another Jones set of larger proportions.

It is interesting to follow in detail the gas manufacture under the improved methods proposed. A total of 90 gallons of oil is used per charge. In the first place 15 gallons are burned in the primary generator to heat the gas set to a sufficient temperature to generate the gas. The air draft is then closed and the additional 75 gallons, known as the make-oil, is sprayed into the heated generator. The heated oil being now in a gaseous state, passes through the generator and superheater as a fixed gas on its way to the wash box. This box is kept under a constant and even water pressure. The water passing through the wash box is kept in a turbulent state so that the lampblack, deposited from the cooling gas as it journeys downward through the water, is carried off with the constantly outgoing water. Hence the washer is a self-cleaning device and is remarkable for its high efficiency. The gas next passes through vertical scrubbers containing wooden trays, placed horizontally one above the other in checkerboard arrangement. Cold water trickles down over this wooden surface and the warm gas journeying upward, coming in contact with these wet surfaces becomes cool and deposits tar and, in addition, the lampblack held in suspension is also carried downward with the trickling water. This water with its lampblack and tar burden is carried on outward to settling tanks in which practically the entire amount of lampblack and tar

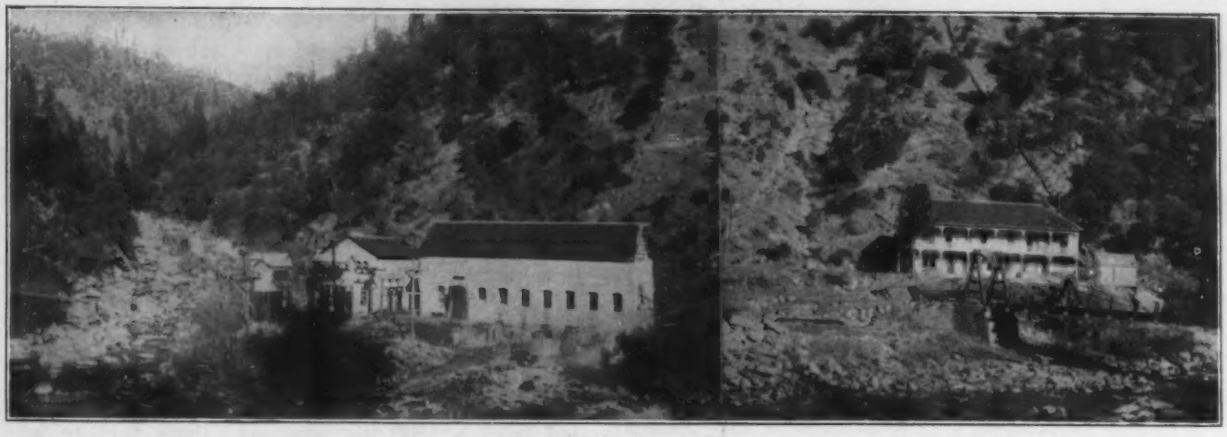
Dam of South Fork of American River.

is recovered and then used as fuel in the plant.

After passing through scrubbers which are 72 ft. x 30 in. in the new installation, the gas passes to the relief holders and is taken through a Root exhauster and thence forced into doubledeck purifiers 18 ft. in diameter and 12 ft. high. These two purifiers each have a capacity of 750,000 cu. ft. and additional space is left for two future purifiers of similar capacity. These purifiers contain iron borings mixed with shavings. As the gas works itself up through this oxide, the sulphur combines with the iron and consequently the gas is left practically free from this injurious content.

After leaving the purifiers, the gas passes through a 12 ft. station meter which is situated in a steel frame meter house covered with corrugated galvanized iron. Thence the gas journeys into the new gas holder which has a capacity of 750,000 cu. ft. The present holder has but a capacity of 60,000 cu. ft. The natural gas from the twelve wells is stored in a holder, having a capacity of 180,000 cu. ft. Both the natural and oil gas are taken through a Connersville booster, which forces the pressure of the gas supply to proper heights for economic distribution through the city of Stockton.

In manufacturing the oil gas, ten minutes is allowed for heating the charge and ten minutes for the manufacture of the gas, hence three charges are made per hour.



American River Power House.

Hydroelectric Plant.

The hydroelectric plant is situated on the south fork of the American River. A concrete dam, 165 ft. along the crest and 40 ft. high diverts the water into a canal. This canal has 4.9 miles of flume, 6 x 5 ft., and 2.1 miles of ditch. From the pen stock, which is 580 ft. above the power house, two combined steel-wood pipes, 30 in. in diameter and 900 ft. long, deliver the water to two hydraulic units which have Doble wheels and Pelton cases. The wheels are of the impulse type. The power house is of concrete construction with steel roof and measures 34 x 80 ft. A Cyclops crane of 20 ton capacity conveniently handles any of the installed apparatus.

Two 1500 kw. Westinghouse generators furnish three-phase current at 2000 volts, which is stepped up by means of a star and delta connection to 55,000 volts for its transmission into Stockton. Lombard governors perform the function of controlling steady operation.

The transformer room is in a concrete building adjacent to the power house, which measures 24 x 40 ft. In this is to be found three 1500 kw. Westinghouse, oil insulated water-cooled, 2000-55,000 volt transformers. There are also two similar 625 kw. spare transformers.

Two 75 kw. exciter units, installed in the main power house, supply ample excitation for the generators. These exciters are impelled by individual Pelton wheels which are supplied from the main penstock pipes.

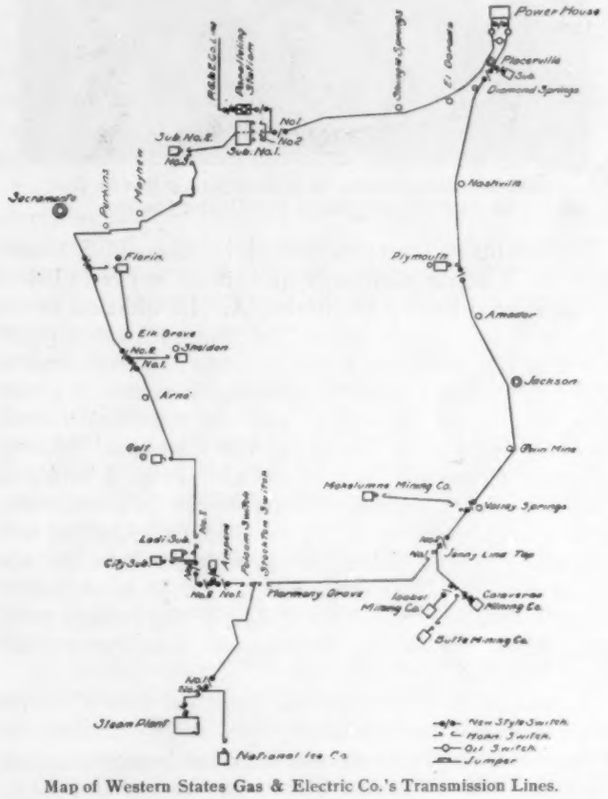
The transmission line is of No. 1 stranded aluminum wire, with the exception of a small portion of the Folsom line between the power house and substation No. 1, which consists of No. 4 copper wire.

The attendants at the hydroelectric plant live at a boarding house owned by the company and managed by the local superintendent of the plant.

Oil circuit breakers are installed on each phase of the transmission line. They are of the Thompson type and are manufactured by the Pacific Electric & Manufacturing Company.

As shown in the illustration there are two high-tension transmission systems emanating from the power house. One branch is known as the Folsom line and the other as the Stockton. Although these two lines are not tied in one with the other, as shown on the map, as a rule, the load on each circuit is well balanced. On the Folsom circuit, 40 per cent of the entire output of the system is used for four large gold dredges owned by the Natomas Consolidated Mining Company, and one by the Ashburton. One-tenth of the output of the system is used to supply the towns of Lodi, Galt, Florin, and other municipalities along the line.

The Stockton line supplies the city of Stockton and operates three gold dredges at Jennie Lind. In addition to this power consumption, two gold mines known as the Alpine Gold Mining Company and the

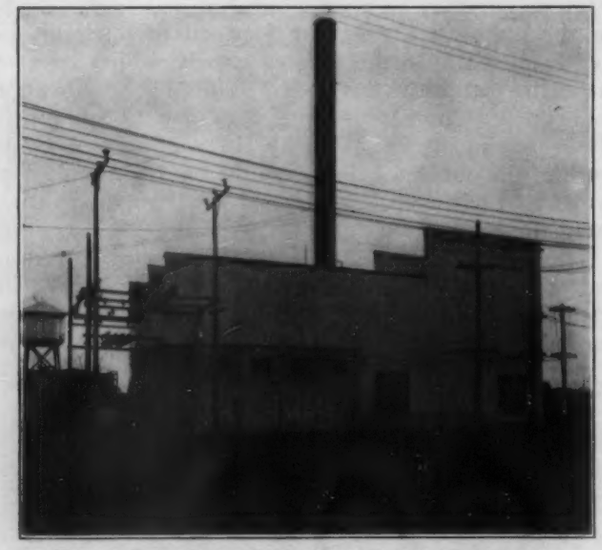


Map of Western States Gas & Electric Co.'s Transmission Lines.

California Exploration Company, are supplied at Plymouth, as well as two gold mines at Placerville. Convenient switches are installed as indicated on the map. In case of an accident these allow of a remarkable pliability and continuity of service to that portion of the line not impaired.

Physical connections are made with the Pacific Gas & Electric Company at two points, one at Substation No. 1 at Natoma and the other at Stockton. Within the next few months physical connection will be made with the Sierra & San Francisco lines which pass within striking distance of Stockton. With such a meshwork as this the Western States Gas & Electric Company is assured of perfect continuity of service.

Wooden poles are used in the transmission system and the insulators are of the four-part Victor type, tested to 100,000 volts. The wires are 6 ft. apart, spaced in an equilateral triangle with the upper apex represented by the insulator on the top of the pole. The complete transmission system comprises about 200 miles of 55,000 volt line.



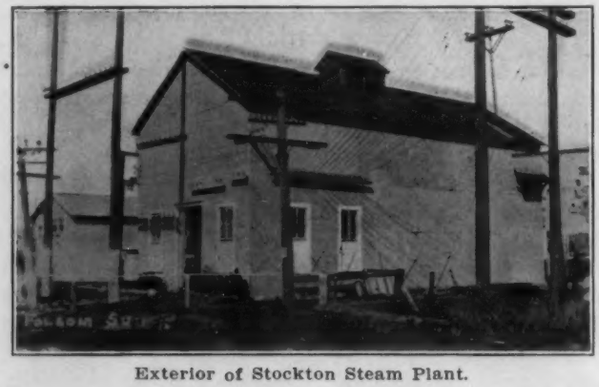
Folsom Substation No. 1, Also Showing Pacific Gas & Electric Company's Paralleling Station.

The plant formerly owned by the old Stockton Gas & Electric Company has been converted into what is now known as Station A. In addition to the principal gas works which are located at this point, there is also installed a 400 kw., 600 volt, 667 ampere, 500 r.p.m., direct current Westinghouse motor generator set. This current is sold to the local electric railway system of Stockton, the Stockton Electric Railway Company. There are also located here two 150 kw. direct current Westinghouse generator sets which are driven by a 200 kw. General Electric synchronous motor. These latter sets are used for elevator service. This station is also used as a distributing substation. In order to handle the voltage properly, three 750 kw. Stanley electric transformers are here installed.

Station B constitutes the main substation for the long distance transmission line and contains the steam auxiliary. There are installed here three Babcock & Wilcox boilers, which, on the basis of 10 sq. ft. of heating surface per h.p., have each a rating of 402.3 h.p. C. C. Moore oil burners, of the back fire type, efficiently supply heat to the Peabody furnaces. The oil is pumped by means of the 6 x 4 x 6 in. Worthington oil pumps. Oil is stored in a 2500 bbl. steel tank which is situated within a safe distance of the main building and has pipe connections to the main tanks of the Standard and Associated Oil Companies.

The main building, housing the boiler and turbine installation, is 60 x 80 ft. with corrugated iron roofing and concrete foundation. The stack is 105 ft. high, 66 inches in diameter and is of steel. A 2 in. centrifugal, motor-driven pump supplies water for the cooling of the transformers and the make-up water for boilers, pumping from a well 135 ft. deep with a 7 in. bore. Thus the company has its own individual water supply. A connection, however, is made to the city mains, for emergency. A 9000 gallon wooden tank reservoirs sufficient water for ordinary operating conditions.

The main power generated in this station is supplied from a 1500 kw. vertical Curtis turbine which



Exterior of Stockton Steam Plant.

operates under 175 lb. gauge pressure, 28½ in. vacuum. A Sturtevant blower, driven by a 15 h.p. motor, supplies forced draft for the generator, and, under these conditions, it is found a 2000 kw. load can be continuously maintained. A 35 kw. Curtis turbine generator set and also a 35 kw. motor driven set constitute the exciters.

The condenser has 6000 sq. ft. of condensing surface. It is of the Worthington type and the same make is also represented in the dry vacuum pump which is 8 x 16 x 12 in. A two-stage Worthington 2½ in. pump, driven by a 10 h.p., General Electric three-phase motor, acts as a wet vacuum pump in pumping the condensate from the hotwell into the heater. A 14 in. circulating pump is steam driven by an 8 x 12 in. Blake engine.

The step-bearing pressure, which is maintained at 700 lb., is supplied by either of two 6 x 2⅛ x 6 in. Worthington pumps. The usual type of baffler is installed to vary the pressure. Two Worthington feed pumps of the Admiralty type, 9 x 6 x 10 in. are utilized in the feed-water supply. This water is heated by a 1000 h.p. Cochrane feed water heater. A 20-ton traveling crane, manufactured by the Cyclops Iron Works, is installed in the station to lift the heavy apparatus.

The switchboard apparatus is of the General Electric standard construction so far as the alternating current installation is concerned. On the other hand the direct current supply is measured by the Westinghouse switchboard instruments.

This station is used as a distributing point in addition to its function of supplying auxiliary power to the main high tension system. Three 1000 kw. General Electric, oil-insulated, water-cooled transformers

maintain the proper 55,000-2200-volt relations. There are also three 275 kw. General Electric, oil-insulated, water-cooled transformers, having the same ratio of transformation. The company supplies considerable power to the Central California Traction Company, which operates an interurban system between the cities of Stockton and Sacramento.

In this station there are to be found a motor generator set, consisting of two 300 kw., 600-volt, 500-ampere direct current Westinghouse generators, directly connected to a 720 h.p., 2300 volt, 60 cycle three-phase Westinghouse synchronous motor. A 60 h.p. induction motor operating at 900 r.p.m., 2300 volts, 60 cycles, is also directly connected to this mechanism and is used as a starting device. This set supplies either 600 or 1200 volts.

Power is also supplied to the Central Traction Company's local lines in Stockton. This is accomplished by means of 400 kw. 600-volt, direct current, Westinghouse generator, directly connected to a 585 h.p. 2200 volt, 500 r.p.m., three-phase, Westinghouse induction motor. Both Station A and Station B may be supplied with energy from the Pacific Gas & Electric Company's lines, the American River station, and soon the Sierra & San Francisco Power Company.

The management have instituted a policy looking toward the improvement of service in every particular. Especially is this true in their efforts to decrease complaints and increase the general usefulness and efficiency of the system. To this end automobiles have been purchased to be ready to answer complaints at all hours of the day and night. A brick garage has been built to house the automobile equipment. This equipment consists of one 2-ton Gramm gas truck, two Reo 1500 lb. gas trucks, one 1-ton electric truck, one 750 lb. electric truck, one 40 h.p. Stoddard-Dayton touring car, and two 20 h.p. Maxwell automobiles.

In its relationship with the mother company, the H. M. Byllesby Company of Chicago, this system presents an interesting illustration of the efficient and close organization maintained. Full and complete managerial reports are sent to the home office each week, including a news letter. This information enables the Chicago office to keep in the closest touch with its subsidiary ownings.

The Western States Gas & Electric Company also controls extensive interests at Richmond and Eureka in California, a complete description of which will appear in later issues of the Journal.

RECENT LEGAL DECISIONS.

When a street car is overloaded and a passenger in attempting to alight gets thrown off the left side of the car and is severely injured the company is responsible for the accident, holds the court in affirming Judge Mitchell Gillian., in King county, Wash., who allowed a $6500 verdict in favor of William J. Elliott to stand against the Seattle, Renton & Southern Ry.

When a lineman climbs a pole and falls because of a defective spot in the wood, the company cannot be held responsible, says the Washington Supreme Court in reversing the Spokane Superior Court in the case of Clyde H. Hood against the Pacific Telephone & Telegraph Company, appellant.

ELECTRIC POWER IN THE MANUFACTURING INDUSTRY ON THE PACIFIC COAST.

E. Dana Durand, director of the United States Census, has thus summarized the industrial application of the Pacific Coast for one of the leading bonding houses:

There are several causes which go to explain the rapid development of manufactures on the Pacific Coast during the past ten years. Two of these causes, namely, the greatly increased use of petroleum fuel and the greatly increased development of hydro-electric power, deserve somewhat detailed consideration. Among other causes which may be incidentally mentioned are the rapid growth of population on the Coast, increasing the demand for manufactured products; the development of agricultural industry, increasing the supply of raw materials; and the advance in the price of lumber throughout the country, resulting in an increased demand for that product from the Pacific Coast States.

At one time the lack of adequate supplies of local coal was considered as a permanent bar to the extensive development of manufacturing industry on the Pacific Coast. The conditions have now been entirely changed, partly by the discovery of considerable supplies of coal on the North Pacific Coast, but much more by the discovery of enormous quantities of petroleum and by improvements in electric transmission, which make possible the economical utilization of the magnificent water powers of the Coast States. In no other section of the country are there so many lofty mountains, with attendant water power, in close proximity to the sea coast and to broad fertile areas. There seems now to be nothing in the way of an almost unlimited development of those industries which require power.

In 1900 the production of crude petroleum in California amounted to 4,324,000 barrels; in 1910 it was no less than 73,011,000 barrels. California now produces 35 per cent of the total petroleum output of the country. Three and one-half barrels of average petroleum are the equivalent of a ton of average coal as fuel, so that the California output of petroleum in 1910 may be considered as the equivalent substantially of 21,000,000 tons of coal. When it is recalled that the total coal production of the United States is only about 400,000,000 tons, the relative magnitude of this petroleum supply is obvious. Petroleum is now by all odds the most important fuel on the Pacific Coast. It is utilized in enormous quantities on the railroads, and even for the fuel of vessels. In manufacturing industries it is the predominant fuel, particularly in California.

The following statement shows the consumption of different kinds of fuel in the manufacturing industries of the Pacific Coast in 1909:

Statistics of Fuel Reported for Manufactures in Pacific Coast States, 1909.

Kind of fuel	Total	Washington	Oregon	California
Coal:				
Anthracite (long tons)	11,151	6,268	462	4,421
Bituminous (short tons)	478,789	417,466	18,158	43,165
Coke (short tons)	166,893	47,420	5,808	113,665
Wood (cords)	413,812	220,727	116,762	76,323
Oil (including gasoline) (bbls)	10,157,088	674,952	599,121	8,883,015
Equivalent approximately to coal (short tons)	2,902,000	193,000	171,000	2,538,000
Gas (1,000 feet)	418,484	90,115	25,821	302,548

The fuel oil consumed in California manufacturing industries in 1909 was no less than 8,883, 015 barrels, or the equivalent of more than 2,500,000 tons of coal, while the total consumption of coal and coke in the same industries was only about 160,000 tons. In Oregon also oil contributes a much larger proportion of fuel to manufacturing industry than coal. Only in Washington does coal outrank oil as a fuel. On the Pacific Coast, as a whole, the consumption of oil as fuel in manufacturing establishments in 1909 amounted to 10,157,088 barrels, or the equivalent of over 2,900,000 tons of coal, while the total consumption of coal itself, including coke, was only 657,000 tons.

It should be noted that there is a considerable consumption also of wood as fuel for manufacturing establishments. A large proportion of this is the waste product of lumber mills. In fact, it is doubtful whether the wood reported as fuel by lumber mills represents the total quantity consumed by them.

Electric Power in Manufactures.

It is impossible to State precisely how much hydroelectric power is utilized in manufacturing industries of the Pacific Coast, but the available statistics make clear the great and increasing importance of such power in manufacturing industry, as well as in public lighting and the operation of street railways. The census schedule of manufactures calls for the horsepower of water wheels owned by manufacturing establishments themselves, and also for the horsepower of electric motors in manufacturing establishments which are operated by current purchased from outside concerns. The returns do not, however, indicate what part of the power generated by water wheels owned by manufacturing establishments is converted into electric power, nor do they indicate what part of the electric power rented from outside concerns is generated by water wheels. It is a well-known fact, however, that the larger part of the rented electric current is generated by water wheels.

The following table shows, for each of the Pacific Coast States, for 1899 and 1909, the horsepower of the several classes of primary engines or motors owned by manufacturing establishments, and also the horsepower of the motors in such establishments which are operated by rented electric current. A separate item shows the horsepower of motors operated by electricity generated by the primary engines owned by the manufacturing establishments themselves; this latter item, of course, is not added into the total, as it would involve duplication, but the horsepower of motors run by rented electric current is included in the total power utilized by manufacturing establishments.

This table shows that in 1909 the horsepower of motors run by rented electric current represented over one-fifth of the total horsepower employed in manufactures, 162,299 out of 802,016. In California the proportion was over 35 per cent. In the factories of that State the horsepower of motors using rented electric current is three-fifths as great as the horsepower of the steam engines owned by such factories. On the Coast as a whole, in addition to the 162,299 horsepower of motors run by rented electric current, the motors run by current generated by the manufacturing establishments themselves have 45,802 horsepower, or a grand total of over 208,000 electric horsepower in factories.

Particularly remarkable is the increase in the use of electric power in factories on the Coast. The horsepower of motors operated by rented electric current increased from 14,428 in 1899 to 162,299 in 1909, or more than eleven-fold. The horsepower of steam engines owned by manufacturing establishments in the meantime multiplied only about two and one-half times. The horse power of motors operated by rented electric current in California increased during the decade from 9624 to 116,437; in Oregon from 2243 to 14,811; and in Washington from 2562 to 30,951. The fact that steam power still far exceeds electric power in importance in the manufacturing industries of Oregon and Washington is largely due to the predominance of the lumber industry in these two States, in which industry steam can be generated cheaply by the use of mill waste, sawdust, and so forth.

Development of Hydroelectric Power.

In connection with these statistics of manufacturing establishments on the Pacific Coast and of the power used in them, it may be of interest to call attention likewise to the statistics of the electrical industry as such. Unfortunately the latest census statistics, which relate to the year 1907, are somewhat out of date in an industry of such rapid development.

The census statistics of the production of electric light and power relate only to central stations, which furnish light or power to the outside public. They do not include electric plants operated by manufacturing, mining, or other concerns for the production of current for their own exclusive use. The following statement shows, for each of the Pacific Coast States, the horsepower of primary motors in central electric stations.

Horsepower of Central Electric Stations.

	Total horsepower		Water wheels, 1907	
	1907	1902	Horsepower	Per cent of total
California	384,673	134,788	208,444	54.2
Oregon	126,815	17,798	102,052	80.5
Washington	67,224	22,894	56,118	83.5
Pacific Coast	578,712	175,480	366,614	63.4
Entire United States	4,098,188	1,845,048	1,349,087	32.9
Pacific Coast's percentage of total for United States	14.1	9.5	27.2	

Horsepower of Engines or Motors in Manufacturing Establishments, 1899 and 1909.

	Pacific Coast			California		Oregon		Washington	
	1909	1899	Per cent increase	1909	1899	1909	1899	1909	1899
Total Power	802,016	274,559	192.1	329,100	126,953	175,019	60,005	297,897	87,601
Owned prime motors									
Steam engines	563,000	220,925	154.8	193,526	105,190	112,244	37,986	257,230	77,749
Water wheels	62,273	30,796	102.2	7,390	4,680	47,041	19,263	7,842	6,853
Gas and all other engines	12,986	5,309	144.6	10,425	4,853	825	195	1,736	261
Electric motors run by rented current	162,299	14,429	1,024.8	116,537	9,624	14,811	2,243	30,951	2,562
Other rented power	1,458	3,100	—52.9	1,222	2,606	98	318	138	176
Electric power generated by primary power above	45,802	7,160	539.7	7,147	6,138	5,991	447	12,664	575

This table shows that in 1907 the central electric stations of the three Pacific Coast States together possessed no less than 578,712 horsepower, or 14.1 per cent of the total for the entire United States. The horsepower of stations on the Pacific Coast had more than trebled during the short period between 1902 and 1907. The most striking feature in the Pacific Coast States, however, is the large proportion of electric current which is generated by water wheels. The horsepower of water wheels of central electric stations in these States in 1907 represented more than five-eighths of the total primary horsepower of such stations. This proportion is far higher than in most other parts of the United States. Of the total capacity of water wheels connected with central electric stations in the entire country more than one-fourth is found on the Pacific Coast.

Income of Central Electric Stations From Electric Service.

	Total	Lighting	Stationary Motors	All other
Pacific Coast—				
Amount—1907....	$18,982,000	$11,470,000	$4,733,000	$2,779,000
Amount—1902....	6,324,000	4,389,000	1,385,000	550,000
Per cent from each source, 1907..	100.0	60.4	24.9	14.7
Per cent from each source, 1902..	100.0	69.4	21.9	8.7
United States—				
Amount—1907....	169,615,000	125,755,000	28,512,000	15,348,000
Amount—1902....	84,186,000	70,138,000	9,910,000	4,138,000
Per cent from each source, 1907..	100.0	74.1	16.8	9.1
Per cent from each source, 1902..	100.0	83.3	11.8	4.9

Another noteworthy feature of the statistics of central electric stations on the Pacific Coast is the large proportion of their current which is sold for use in stationary motors, such current for the most part representing that used in manufacturing industries. The statistics do not show the actual quantity of current sold for different purposes, but they do show the amount of revenue obtained from current according to classes of service.

The figures given in the above table for the income from lighting service represent, not only the direct income of the stations from lights operated by ing companies; as the returns of all lighting companies are also included, this item involves some duplication; the other two items have little or no such duplication. The item of "Receipts from all other current" represents chiefly that furnished to street railway companies by the central electric stations. It will be seen that in 1907 the total income of the central electric stations in the Pacific Coast States from electric service was $18,982,000, of which almost exactly one-fourth was derived from current furnished for stationary motors. For the United States as a whole the revenue from current furnished to stationary motors was only about one-sixth of the total revenue. The income of central electric stations on the Pacific Coast from electric service trebled from 1902 to 1907, and the income from current furnished to stationary motors considerably more than trebled.

It is peculiarly fortunate for the manufacturing and other industries of the Pacific Coast that two enormously important new sources of power—oil fuel and water power—have been developed side by side during recent years. Had either one alone come into the field, there might have been some danger of monopoly with consequent high rates for power.

PACIFIC COAST A. I. E. E. CONVENTION.

The 271st meeting of the American Institute of Electrical Engineers was called to order at 11:00 a. m. April 16th, at Portland, Oregon, by F. D. Weber, chairman of the Portland section. S. G. McMeen gave the address of welcome which was responded to by President Gano Dunn.

An excellent program of papers was presented, as has been previously noted in these columns, and a most spirited and enthusiastic discussion was held among the 150 members in attendance. All present voted this to have been the most successful of the Institute meetings yet held in the Pacific Coast, not only in point of attendance and in value of papers presented, but also in the good feeling engendered.

The informal banquet on Tuesday evening was the real get-together of the convention, about 150 members and ladies being seated in the blue dining room of the Hotel Multnomah. F. D. Weber, chairman of the Portland Section introduced B. S. Josselyn, president of the Portland Railway, Light & Power Company, as the first speaker, Mr. Josselyn giving a forceful address of welcome. S. G. McMeen spoke in his inimitable vein of spontaneous wit. W. W. Briggs was then called upon as the only original single-jointed ambidexterous talker on earth. Mr. Briggs maintained his reputation to such good advantage that President Dunn later proposed a fourth grade of membership in the Institute, of which Mr. Briggs would be the first member, a grade still higher than Fellow, namely, that of "Good-Fellow." A. H. Babcock created much amusement by explaining the "kitchen cabinet," but later took the membership to task for neglecting the proper spirit of welcome to President Dunn in their eagerness to tell about local things for which Mr. Dunn had frequently expressed the greatest admiration and appreciation. President Dunn's opening remarks and pleasing manner earned for him the title of the "golden tongued speaker." As he proceeded he gracefully took up the subject appointed, that of the next International Engineering Congress to be held in San Francisco in 1915, paying a glowing tribute to those San Francisco members who had succeeded in obtaining this. J. E. MacDonald with a few clever anecdotes handled the subject of "Conventions" most satisfactorily. J. E. Davidson, manager of the Pacific Power & Light Company, told of the coming National Electric Light Association Convention at Seattle. The last scheduled speech was by Mr. Ralph W. Pope, honorary secretary. In addition there were a number of unannounced speeches by Mr. Dunn and Mr. McMeen much to the delight of the listeners and Mrs. A. H. Babcock responded to the president's request to give them a few remarks, in her usual capable and witty manner. The president then proposed three cheers for the first lady to speak at an A. I. E. E. gathering.

Wednesday morning was devoted to papers and discussions and in the afternoon over one hundred members and their ladies embarked on the steamer "Undine" for a trip to Willamette Falls. A stop was made at Station "A" of the Portland Railway, Light & Power Company in order that the visitors might inspect its equipment, the feature of saw-dust fuel

exciting most comment. The trip to the falls was uneventful but on the return the vessel ran aground while attempting to navigate an abrupt turn in the swift current and after futile attempts to float her a call was sent to Portland for another boat. Meanwhile, the ladies and their escorts were taken off in a launch and were returned from Oregon City on the interurban electric while the remainder awaited until a later hour for the boat from Portland.

The whole of Thursday was devoted to papers and discussions and in the evening Mr. A. B. Babcock brought the regular sessions of the convention to a close with an illustrated lecture on the Southern Pacific Company's electric suburban system around San Francisco Bay. This was given in the ball-room of the Hotel Multnomah with a large attendance.

At the conclusion of the lecture, O. B. Coldwell, in behalf of the Portland Section, presented President Dunn with a massive silver loving cup. Mr. Dunn was completely taken by surprise and was momentarily at a loss for words notwithstanding his quick wit and everready gift for speaking. However, in a few words of pleasing tribute he expressed his thanks and in closing invited the assembly to join him in christening the cup. Brimming with champagne it was passed around several times, thus giving a most happy and auspicious ending to the convention.

On Friday an all-day excursion was taken to the River Mill and Estacada plants of the Portland Railway, Light & Power Company in a special train occupied by 150 members and guests. Lunch was served at the hotel and the day made pleasant by every possible courtesy from the company officials.

The following guests and members were in attendance:

Visiting Ladies.

Babcock, Mrs. A. H.....Oakland, California
Brereton, Mrs. W. P.....Portland, Oregon
Briggs, Mrs. W. W.....San Francisco, California
Bowden, Mrs. R. A.....San Francisco, California
Barthold, Mrs. G. M.....Portland, Oregon
Eliot, Mrs. Edward M.....Portland, Oregon
Cramer, Mrs. L. B.....Portland, Oregon
Corbett, Mrs. L. J.....Moscow, Idaho
Collins, Mrs. C. R.....Seattle,Washington
Coldwell, Mrs. O. B.....Portland, Oregon
Deakin, Mrs. G.....Berkeley, California
Ewart, Mrs. Erma.....Portland, Oregon
Ewart, Mrs. A. C.....Portland, Oregon
Ewart, Miss Evalyn.....Portland, Oregon
Fuller, Mrs. F. I.....Portland, Oregon
Fullerton, Mrs. D. P.....San Mateo, California
Hillebrand, Mrs. W. A.....Corvallis, Oregon
Kribs, Mrs. G.....Portland, Oregon
Martin, Mrs. J. C.....Portland, Oregon
Monges, Mrs. R. F.....Portland, Oregon
McMeen, Mrs. S. G.....Chicago, Illinois
Moody, Mrs. A. S.....Portland, Oregon
Nock, Mrs. G. P.....Portland, Oregon
Pruden, Miss A. Bird.....Portland, Oregon
Pope, Mrs. Ralph W.....Elizabeth, New Jersey
Peaslie, Mrs. Maude M.....Portland, Oregon
Smith, Mrs. Clinton B.....Portland, Oregon
Scott, Mrs. William D.....Portland, Oregon
Searing, Mrs. E. D.....Portland, Oregon
Turner, Mrs. Wm. S.....Portland, Oregon
Le Tourneau, Mrs. E. H.....Portland, Oregon
Van Norden, Mrs. R. W.....San Francisco, California
Weber, Mrs. F. D.....Portland, Oregon
West, Mrs. Edward A.....Portland, Oregon
Wakeman, Mrs. Wm. J.....Portland, Oregon

Local Members and Their Guests.

Anderson, B. I.
Barthold, G. M.
Burghduff, A. E.
Brill, O. C.
Beagles, Fred
Bonness, E. W.
Baldwin, L. H
Barton, R. C.
Brereton, W. P.
Barker, Geo. N.
Bell, H. W.
Brown, C. L.
Cramer, L. B.
Coldwell, O. B.
Chace, W. B.
Geisbeek, S.
Green, Franklin C.
Harris, Geo. F.
Harza, L. F.
Hoen, W. M.
Herring, W. E.
Hays, D. S.
Kribs, Gordon
Komler, G. A.
Lauridsen, L.
LeFever, O. D.
Lebenbaum, Paul
Lanyne, S. Herbert
Miller, E. B.
McGonigle, Chas.
Rawson, F. P.
Reed, M. E.
Rockwood, J. A.
Roberts, T.
Read, Lance
Ransopher, S. M.
Sampson, C. M.
Schoolfield, H. H.
Smith, C. M.
Scott, W. D.
Smith, Clinton D.
Stearns, Wm. G.
Smith, Warren P.
Searing, E. D.
Swartz, T. W.
Colvin, C. W.
Cannon, E. F.
Condit, B. C.
Condit, E. R.
Carroll, R. S.
Campbell, W. C.
Darlington, F. W.
Davis, J. R.
Elder, L. R.
Eliot, Edward M.
Friendly, H. M.
Fuller, F. I.
Gray, J. S.
Grey, G. O.
Monges, R. F.
Martin, J. C.
Murphy, F. H.
McGee, D. F.
Moody, A. S.
McMicken, A. C.
McCoy, Louis E.
Montieth, Arthur D.
Mulock, Red H.
Nock, G. P.
Osborn, C. P.
Parker, G. L.
Peaslee, W. D.
Porz, H. E.
Shearer, H. A.
Townsend, J. R.
Turner, Wm. S.
Le Tourneau, E. H.
Vorse, H. L.
Weill, Stuart I.
Whipple, Cyrus A.
Wernicke, Carl L.
Wakeman, H. R.
Weber, F. D.
Whitney, E. F.
Waldman, C. A.
West, Edward A.

Visiting Members and Their Guests.

Asplund, J. W.....Marshfield, Oregon
Alvord, R. M.....San Francisco, California
Albert, L. F.....Moscow, Idaho
Allen, E. G.....Seattle, Washington
Blaisdell, Jerome.....Bull Run, Oregon
Balknap, J. H.....Corvallis, Oregon
Brofos, E. A.....New York City
Briggs, W. W.....San Francisco, California
Boesch, John Emile.....Vancouver, British Columbia
Bass, J. E.....Los Angeles, California
Boynton, W. P.....Eugene, Oregon
Babcock, A. H.....San Francisco, California
Converse, Professor Charles Willard.....Eugene, Oregon
Coaterline, Harold.....Eugene, Oregon
Corbett, L. J.....Moscow, Idaho
Clark, S. B.....Oswego, Oregon
Currin, H. P.....Cottage Grove, Oregon
Carpenter, H. V.....Pullman, Washington
Cohen, Leeser R. Solis.....Corvallis, Oregon
Cooley, Geo. R.....Seattle, Washington
Cornick, Tully R.....Petaluma, California
Collins, C. R.....Seattle, Washington
Christiansen, Conrad.....Toledo, Oregon
Creveling, A. B.....Pullman, Washington
Chappell, W. Campbell.....Vancouver, British Columbia
Dearborn, R. H.....Eugene, Oregon
Day, R. C.....Corvallis, Oregon
Dyson, A. H.....Chicago, Illinois
Dunn, Gano.....New York City
Deakin, G.....San Francisco, California
Downing, P. M.....San Francisco, California
Dunphy, Chester A.....Pullman, Washington
Ewart, Fred E.....Corvallis, Oregon
Eisenmenger, F. Z.....Cleveland, Ohio
Edgar, B. C.....San Francisco, California
Euler, W. G. B.....San Francisco, California
Fisken, John B.....Spokane, Washington
Fujihira, Y.....Wakayama, Japan
Fullerton, D.....San Mateo, California
Gilbert, L. D.....Los Angeles, California
Greisser, V. W.....Spokane, Washington
Griswold, A. H.....San Francisco, California
Gaytes, Herbert.....Oakland, California
Goodwin, W. L.....San Francisco, California
Goldrick, H. C.....San Francisco, California
Hungate, J. W.....Spokane, Washington
Hall, H. Y.....San Francisco, California
Haller, L. W.....Corvallis, Oregon
Hillebrand, W. A.....Corvallis, Oregon
Howes, Robert.....Seattle, Washington
Jepperson, A. M.....Corvallis, Oregon
Jeter, F. A.....Spokane, Washington
Ismey, James.....Pullman, Washington
Jones, Allen G.....San Francisco, California
King, John R.....Seattle, Washington
Kennedy, Rolland C.....Eugene, Oregon
Keehhar, Bishan Dass.....Nurmahal, India
Kistler, L. H.....Eugene, Oregon
Lake, Norman L.....Pullman, Washington
Lisberger, S. J.....San Francisco, California
Lindsay, S. C.....Seattle, Washington
Miller, A. A.....Seattle, Washington
Meyers, Cyrel H.....Gresham, Oregon
Macdonald, J. E.....Los Angeles, California
Martin, Alex.....Eugene, Oregon
Murphy, E. M.....Burke, Idaho
McGuire, J. P.....Eugene, Oregon
Main, Wm. S.....Eugene, Oregon
Murphy, George R.....San Francisco, California
Milner, Geo. R.....Corvallis, Oregon
McMillan, Fred O.....Corvallis, Oregon
Nims, F. D.....Vancouver, British Columbia
Neill, Will T.....Eugene, Oregon
Northrop, F. Ford.....Eugene, Oregon
Nelson, I. E.....Corvallis, Oregon
McKenzie, Robert R.....Corvallis, Oregon
LaMoulin, Walter W.....Corvallis, Oregon
McMeen, S. G.....Chicago, Illinois
Outhank, Karl W.....Eugene, Oregon
Pope, Ralph W.....Elizabeth, New Jersey
Pattee, Clyde.....Eugene, Oregon
Porter, C. J.....Port Dover, Ontario, Canada
Shepard, E. R.....Corvallis, Oregon
Saurman, A. B.....San Francisco, California
Smith, Byron H.....Springfield, Oregon
Sampson, Geo. H.....Calgary, Alberta, Canada
Schoel, W. A.....Dallas, Oregon
Spurrier, Odith K.....Corvallis, Oregon
Smith, Hugh I.....Corvallis, Oregon
Stewart, S. I.....Lebanon, Oregon
Thayer, Geo.....Eugene, Oregon
Turner, C. A.....San Francisco, California
Varner, W. R.....Corvallis, Oregon
Van Norden, Rudolph W.....San Francisco, California
Woods, J. LeRoy.....Albany, Oregon
Wooster, L. F.....Corvallis, Oregon
Wright, L. Earl.....Pullman, Washington
Washburne, Claude B.....Springfield, Oregon
Weniger, W.....Corvallis, Oregon
Welch, James W.....Pittsburg, Pennsylvania
Yates, J. E.....Pullman, Washington
Zipp, Philip H.....Oswego, Oregon

WESTERN LAWS OF ELECTRICITY AND WATER

THE DOCTRINE OF APPROPRIATION.

BY A. E. CHANDLER.

Most of the Western States have adopted statutes which place the control of water appropriations in the office of the State Engineer. In all but a few, such statutes were but recently adopted so that the great mass of water rights resting on the doctrine of appropriation must be defined by the principles laid down from time to time by the courts. In the first article it was stated that the California statutes (Sections 1410 to 1422 of the Civil Code) were but declaratory of existing law (established by the courts). Similar statutes were first adopted in the other Western States and the court rulings throughout differ but little.

Appropriations Not Restricted to Public Lands.

The statement is generally made by those advocating the riparian doctrine that appropriations (in riparian right States) can only be made on the public lands and this view is somewhat sanctioned by earlier California decisions. In Duckworth v. Watsonville (150 Cal. 520) the rule is positively stated as follows:

> The right to appropriate water under the provisions of the Civil Code is not confined to streams running over public lands of the United States. It exists wherever the appropriator can find water of a stream which has not been appropriated and in which no other person has or claims superior rights and interests.

The above does not mean that one may trespass upon private property and make a diversion. The right of way for the ditch or conduit must, of course, be secured from the owner of the riparian land.

In regard to appropriations and use on public lands not subject to entry it has been recently held by the Supreme Court of Washington in Avery v. Johnson (109 Pac. 1028) that no such right "can be acquired by one illegally occupying land in an Indian reservation, prior to the opening of the reservation to settlement under the homestead law."

Waters Open to Appropriation.

The statutes governing appropriations refer to the waters subject thereto as "running water flowing in a river or stream," "natural watercourses," "all waters," or use other expressions of the same nature, and a few enumerate in addition "lakes" and "springs." The courts treat the waters of a "natural watercourse" as being open to appropriation and a definition often quoted is the following, from Los Angeles etc. v. Los Angeles (103 Cal. 466).

> There must be a stream, usually flowing in a particular direction, though it need not flow continually. It may sometimes be dry. It must flow in a definite channel,, having a bed or banks, and usually discharge itself into some other stream or body of water. It must be something more than a mere surface drainage over the entire face of the tract of land, occasioned by unusual freshets or other extraordinary causes. It does not include the water flowing in the hollows or ravines in land, which is mere surface water from rain or melting snow (i.e., snow lying and melting on the land), and is discharged through them from a higher to a lower level, but which at other times are destitute of water. Such hollows or ravines are not, in legal contemplation, watercourses.

The statement that all waters of natural watercourses may be appropriated must be qualified in the case of navigable streams. In Miller v. Enterprise Company (142 Cal. 178) the plaintiff sought to enjoin the defendant, a subsequent appropriator, from interfering with his dam and ditch, and the latter defended its action on the ground that plaintiff's dam obstructed a navigable stream, the San Joaquin River. It was held that as the plaintiff had for many years appropriated water from the river, a navigable stream, without complaint from any public authority, state or national, and that while navigation had been interfered with, no person not connected with the government could complain. All cases between individuals raising the question of interference with navigation will undoubtedly be decided in the same way. It is well established, however, that the government may not only stop diversions from the navigable part of a stream but also even those from the non-navigable part, including tributaries, if such diversions will interfere with navigation. (United States v. Rio Grand D. & I. Co., 174 U. S. 690).

In actual work lake waters are often appropriated. It was contended in the Duckworth case (above) that such waters were not "running water flowing in a stream." but the court held:

> We think the better doctrine in respect to the character of a stream from which the statute provides for appropriations is that it is not necessary that the stream should continue to flow to the sea or to a junction with some other stream. It is sufficient if there is flowing stream; and the fact that it ends either in a swamp, in a sandy wash in which water disappears, or in a lake in which it is accumulated upon the surface of the ground, will not defeat the right to make the statutory appropriation therefrom, and we can see no reason why the appropriation in such a case may not be made from the lake in which the stream terminates, and which therefore constitutes a part of it, as well as from any other part of the water course.

In Hough v. Porter (98 Pac. 1083) the Oregon Supreme Court held, contrary to the above, in speaking of riparian rights, that when water spreads, as in a swamp or marsh, "with no well-defined current it cannot be deemed a water course." As the Oregon statutes now provide for the appropriation of "all waters" within the State, this ruling cannot affect appropriators.

It is well settled that water in artificial channels or reservoirs cannot be appropriated and waters artificially developed as in a mining tunnel and allowed to flow in a natural water course to place of intended use are likewise exempt. It has been recently held by the Supreme Court of New Mexico in Vanderwork v. Hewes (110 Pac. 567), decided August 9, 1910, that "seepage water or waters from snows, rain, or springs, not traceable to and forming a stream or water course" may be used by the owner of the land on which they rise and are not subject to appropriation without his consent. The rule was followed by the Idaho Supreme

Court in King v. Chamberlin (118 Pac. 1099) decided Nov. 3, 1911, where the waters in question were surface waters collected in a reservoir on plaintiff's land.

In the first article the notice of appropriation from De Wolfskill v. Smith (5 Cal. App. 175) was given. It was for the water flowing from abandoned oil wells on the public domain. The court held that as the water had gathered into a stream, it was immaterial "whether this stream is supplied by water percolating and filtering through the earth or not." The difference between this case and those cited in the last paragraph is that these waters, though artificially developed, had been abandoned, and the others had been retained in private possession.

Proceedings to Effect Appropriations.

An appropriation has been defined as "the intent to take, accompanied by some open, physical demonstration of the intent, and for some valuable use."

Since the adoption of the early statutes providing for the posting of notices at the point of intended diversion, the "intent" is expressed in the notice. Following the notice, the steps are the recording of the notice and the initiation of the construction work within the time designated—generally ten and sixty days respectively—the prosecution of construction to completion with reasonable diligence and the application to beneficial use. If the steps be followed, the water right dates from the posting of the notice.

The question of reasonable diligence is a serious one and especially so as a very erroneous view is abroad in the land. A common idea is that all one need do "to hold the claim" is to act about as he would to hold a mining claim, and the result is that the occasional use of a shovel and wheelbarrow are supposed to satisfy the requirement. The error of this view was shown in a very early Nevada case, Ophir Mining Company v. Carpenter (4 Nev. 534) which is often quoted on this question by other courts. The following sentences are very much to the point and picture conditions typical of far too many of our so-called water claims:

> If the labor of twenty men for three or four months, in a period of two years and a half, constitutes diligence in the prosecution of such a vast enterprise as this, it is difficult, if not impossible, to designate the entire want of diligence. The manner in which this work was prosecuted certainly does not accord with what is generally understood to be reasonable diligence. Diligence is defined to be the "steady application to business of any kind, constant effort to accomplish any undertaking." The law does not require any unusual or extraordinary efforts, but only that which is usual, ordinary and reasonable. The diligence required in cases of this kind is that constancy or steadiness of purpose or labor which is usual with men engaged in like enterprises, and who desire a speedy accomplishment of their designs. Such assiduity in the prose cution of the enterprise as will manifest to the world a bona fide intention to complete it within a reasonable time. It is doing of an act, or series of acts, with all practical expedition, with no delay, except such as may be incident to the work itself. * * * * * * The weather would not have prevented work upon this ditch ordinarily more than three or four months in the year, hence labor upon it could probably have been prosecuted during eight or nine months out of every twelve. Here, however, there was a period of thirty months, when only about three months' work was done, or one month out of every ten. Rose during this time may have dreamed of his canal completed, seen it with his mind's eye yielding him a great revenue; he may have indulged the hope of providential interposition in his favor; but this cannot be called a diligent prosecution of his enterprise. Surely he could hardly have expected to complete it during his natural life by such efforts as were made through this period.

As the question of diligence is one of fact it will ordinarily, in case of litigation, be decided by a local jury. The jury may have a far less stringent view of "that constancy or steadiness of purpose or labor" than the ordinary engineer, but it will be obliged to decide on at least a fair degree of it. The size and character of the works, the natural conditions, including climate and material, and all other modifying elements, must be considered. Illness or lack of money are generally held to be no excuse for delay but the latter has been accepted as a valid excuse in Colorado and Idaho.

Incomplete Appropriations.

Prior to the completion of the diversion works and the readiness to apply the water to beneficial use the appropriation is incomplete. In Rincon Water & Power Company v. Anaheim Union Water Company (115 Fed. 543) Judge Welborn after quoting Sections 1415 to 1418 of the California Civil Code said:

> It is obvious that a person who intends to become an appropriator under these sections cannot acquire the exclusive right to the use of the water he intends appropriating, nor maintain any suit, either at law or in equity, for its diversion, until all the steps requisite to an appropriation have been taken. * * * From the statutory enactments and general principles above quoted and stated, the conclusion is not only fair, but unavoidable, that the only right which a person acquires by posting a notice is the right to prosecute without interference the works necessary to consumate his intended appropriation.

The question was before the California Supreme Court recently in two cases, resulting from the operations of Los Angeles in the Owens Valley—Inyo Consolidated Water Company v. Jess (119 Pac. 934) decided Dec. 11, 1911, and Merritt v. Los Angeles (120 Pac. 1064) decided Jan. 19, 1912. The plaintiff in each case had filed a notice of appropriation on a stream within a national forest and had made application to the Forest Service for permission to construct the conduit. No work had been done in either case as the Forest Service had not acted on the application, and Section 1422 of the Civil Code allows 60 days after the grant of permission from the federal authorities in which to begin construction. Each action was brought to obtain an adjudication of the alleged conflicting claims and the lower court, following the early decisions, decided that the plaintiff had no property interest on which to base the suit. The Supreme Court, however, decided that the plaintiff had "an incomplete, incipient, conditional right in the water, which is a vested interest in real property, and which may be adjudged to be such in an action to determine conflicting claims." In the later case the Supreme Court added:

> Such judgment, of course should not declare the plaintiff absolutely entitled to the water, nor enjoin the defendant from taking or using it during the intervening time prior to the completion of plaintiff's works to a stage which will enable him to divert and use it. It should only declare and describe the plaintiff's contingent right to use the water and enjoin adverse claims or uses injurious thereto.

The only effect of the two decisions, therefore, is to secure to the owner of an incomplete right a determination of conflicting claims. They do not allow interference with either construction of works or actual diversions.

The Measure of the Right.

Under a great many of the early decisions not only was the minimum capacity of the ditch decreed but very often the amount mentioned in the notice, which might be far in excess of the maximum capacity. The holders of these old rights very naturally looked upon the amount decreed as their water, whether they had use for it or not, and believed that they had the right to sell as desired. No court would tolerate such a view today. It is now generally held that a right to the use of water is limited in time and volume to the extent of the needs of the possessor thereof.

The rule is well illustrated by the following quotation from McCoy v. Huntley (119 Pac. 481) decided by the Supreme Court of Oregon Jan. 15, 1912.

We see no reason why, even in cases involving prior and subsequent appropriations of water, the courts cannot require the appropriators to alternate in the use of the water. The time when water may be used recklessly or carelessly has passed in this State. With increasing settlement water has become too scarce and too precious to justify any but an economical use of it. An appropriator has only the right to use so much as his needs require and at the time his needs require. And if these are satisfied by a use of the whole flow every other day, or every alternate week, he ought not to be heard to complain. It is evident that from some cause or from a variety of causes the waters of Pine creek are diminishing in volume at the point where the parties to this controversy are residing. It is now probable that to divide the water, without alternating, would injure both parties. A test, since the preliminary order was made in this case in 1906, indicates that by the method adopted both parties can raise good crops and both prosper.

Principles of Prior Appropriation.

Probably the best judicial summary of the principles of prior appropriation appearing in the reported cases is that of Judge Hawley in Union Mill & Mining Company v. Danburg (81 Fed. 73) decided May 24, 1897. It was Judge Hawley who, when a justice of the Nevada Supreme Court, wrote the opinion in Jones v. Adams overruling Van Sickle v. Haines and abrogating the doctrine of riparian rights in Nevada. His opinions in both the law of mines and the law of waters show a deep knowledge of the industries affected and an earnest desire to assist in bettering conditions. The reader will find the Dangberg case both interesting and instructive. The summary follows:

Under the principles of prior appropriation, the law is well settled that the right to water flowing in the public streams may be acquired by an actual appropriation of the water for a beneficial use; that, if it is used for irrigation, the appropriator is only entitled to the amount of water that is necessary to irrigate his land, by making a reasonable use of the water; that the object had in view at the time of the appropriation and diversion of the water is to be considered in connection with the extent and right of appropriation; that, if the capacity of the flume, ditch, canal, or other aqueduct, by means of which the water is conducted, is of greater capacity than is necessary to irrigate the lands of the appropriator, he will be restricted to the quantity of water needed for the purposes of irrigation, for watering his stock, and for domestic use; that the same rule applies to an appropriation made for any other beneficial use or purpose; that no person can, by virtue of his appropriation, acquire a right to any more water than is necessary for the purpose of his appropriation; that, if the water is used for the purpose of irrigating lands owned by the appropriator, the right is not confined to the amount of water used at the time the appropriation is made; that the appropriator is entitled, not only to his needs and necessities, at that time, but to such other and further amount of water, within the capacity of his ditch, and further amount of water, within the capacity of his ditch, as would be required for the future improvement and extended cultivation of his lands, if the right is otherwise kept up; that the intention of the appropriator, his object and purpose in making the appropriation, his acts and conduct in regard thereto, the quantity and character of land owned by him, his necessities, ability, and surroundings, must be considered by the courts, in connection with the extent of his actual appropriation and use, in determining and defining his rights; that the mere act of commencing the construction of a ditch with the avowed intention of appropriating a given quantity of water from a stream gives no right to the water unless this purpose and intention are carried out by the reasonable, diligent, and effectual prosecution of the work to the final completion of the ditch, and diversion of the water to some beneficial use; that the rights acquired by the appropriator must be exercised with reference to the general condition of the country and the necessities of the community, and measured in its extent by the actual needs of the particular purpose for which the appropriation is made, and not for the purpose of obtaining a monopoly of the water, so as to prevent its use for a beneficial purpose by other persons; that the diversion of the water ripens into a valid appropriation only where it is utilized by the appropriator for a beneficial use; that the surplus or waste water of a stream may be appropriated, subject to the rights of prior appropriators, and such an appropriator is entitled to use all such waters; that, in controversies between prior and subsequent appropriators of water, the question generally is whether the use and enjoyment of the water for the purposes to which the water is applied by the prior appropriator have been in any manner impaired by the acts of the subsequent appropriator." Union Mill & Mining Company v. Dangberg, 81 Fed. 73.

SHOULD COMPANIES BE TAXED FOR POWER SOLD TO SUBSIDIARIES?

Attorney-General Webb of California has been called upon by the State Board of Equalization to advise the board on an important question concerning the proper procedure to be followed by the board in the matter of taxing or exempting from taxation the power generated by companies which sell part of their output to subsidiary concerns and use the remainder for their own purposes. The board holds that where a corporation generates power, such as electricity, for the manufacture of ice, using the ice to refrigerate cars, that power is a just charge on the company in its report of gross earnings.

Some of the corporations deal in power in this way, selling it to its subsidiary concerns, using some of it for itself and selling the product. It claims exemption from charge for the power as an item of its earnings.

This question was raised last year by several large operative concerns and a satisfactory adjustment could not be reached by the board and the contending concerns. The Attorney-General has been called upon to solve the knotty problem, and upon his decision rests whether or not the companies will be charged up with the important item.

The board claims that by allowing exemption from State taxation on this one point will result in many evasions by the big concerns.

DRAFTING ROOM PRACTICE, II.

BY A. L. MENZIN.

The making of drawings involves two classes of work—pictorial representation and lettering. The first is produced by the use of lines of various structure and of various thicknesses. To secure uniformity, certain lines must be adopted as standard for certain purposes: the selection of these lines is dictated by the requirements of rapid execution and artistic appearance.

Solid lines can be drawn much more rapidly than lines made up of dashes, and lines made up of long dashes can be drawn much more rapidly than lines made up of short ones; for the time required to draw a line between two given limits is practically proportional to the number of pauses made. Solid lines should therefore be used as freely as is consistent with clearness and artistic appearance, and when broken lines are desirable the dashes should be as long as will look well.

Light lines permit of much more rapid work than heavy lines; for the heavier the lines, the longer it will take for the ink to dry and the slower will be the progress possible. A too liberal use of heavy lines is therefore undesirable.

In the choice of lines due consideration must be given to the appearance of the ultimate result. The tracing is not in itself the ultimate result but is only a means to an end—the blue print. A well appearing tracing does not necessarily assure a well appearing blue print, for blue printing produces some very noticeable differences in contrasts.

If a blue print is examined it will be noticed that the fine lines have a bluish tinge while the heavy lines are white. There is therefore much greater contrast between the heavy and light lines on a blue print than between similar lines on the tracing. There is also much less contrast between bluish white lines and the blue surface of the blue print paper than between black lines and the bluish white surface of the tracing cloth.

On account of the tracing being a positive and not a negative, lines on a blue print are somewhat thinner than corresponding lines on the tracing. This should also be kept in mind.

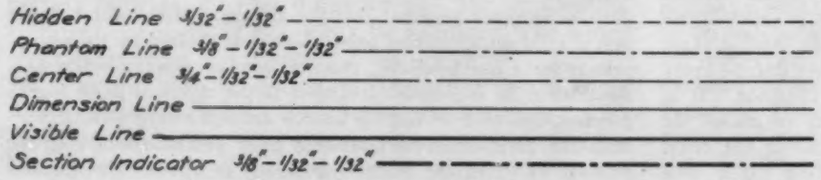


Fig. 1. Standard Lines for Working Drawings.

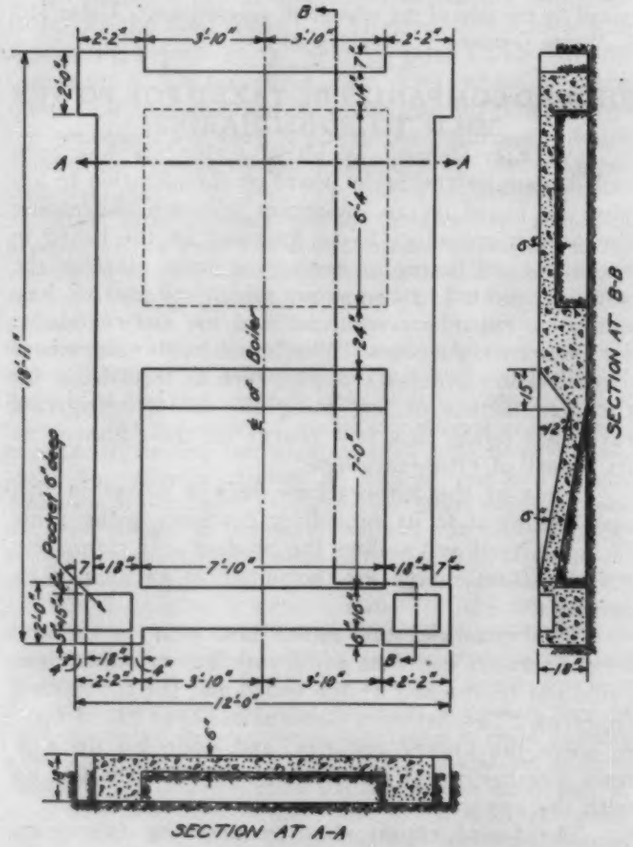


Fig. 2. Use of Miscellaneous Lines.

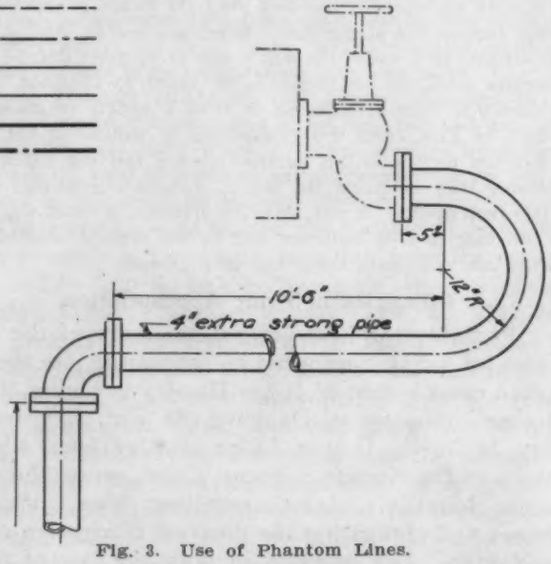


Fig. 3. Use of Phantom Lines.

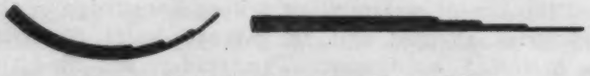


Fig. 4. Method of Drawing Heavy Lines.

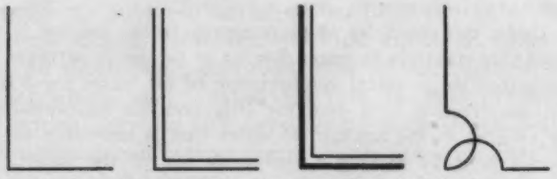


Fig. 5. Miscellaneous Margins.

Allowance should be made for a reasonable amount of underprinting and overprinting, for blue prints are made rapidly and without especial care. The tracing must be such as to assure a good average print.

For the requirements of the commercial drafting room the lines shown in Fig. 1 are suggested.

The hidden line is the lightest, the center, phantom and dimension lines are somewhat heavier, the visible line is decidedly heavier and the section indicator is heavier still.

Hidden lines should be preferably as light as can be drawn with the pen for then the visible lines will stand out more prominently and make the appearance of the object clearer.

To the left of the lines in Fig. 1 are given lengths of dashes and spaces. These are, of course, approximated by eye. By having some definite dimension in mind more uniform work will result.

Fig. 2 shows a boiler foundation and is intended to illustrate the use of all the lines noted above except the phantom line.

The limit lines for dimensions should approach but not touch the visible lines, so as not to confuse the appearance of the object. It is also advisable to keep the dimension lines off of the object as much as possible for the same reason, but this should not be carried too far.

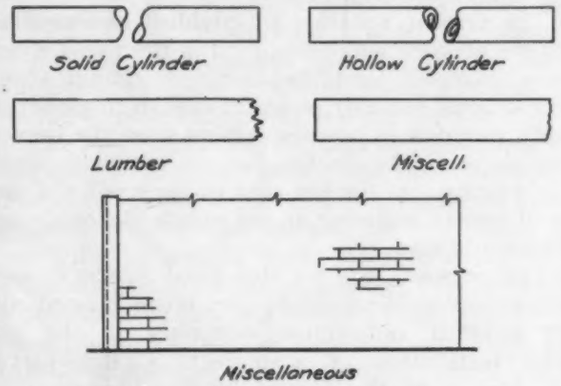


Fig. 6. Conventional Breaks.

A good rule for placing dimension lines is to put them on the view on which the constructor will measure them. An observance of this rule will often save the constructor a great deal of labor in mentally transferring dimensions from one view to another.

The section indicator, as its name implies, is used to indicate that a sectional view along its length may be found elsewhere. The placing of arrows on the indicators, as at A—A and B—B, gives them more prominence, which is desirable.

Fig. 3 is supposed to be part of a piping drawing and is intended to show the use of the phantom line. It is often desired to include in a drawing the relative position of an object which the drawing does not call for, such as the throttle valve in the drawing referred to. The phantom line is also used to represent an alternative position of an object shown on the drawing in visible lines, such as a gate, lever, valve, etc. Lines consisting of dashes are often used for this purpose. The combination of long and short dashes seems to look better. This, of course, is a matter of personal taste.

Besides the lines noted above it is often desirable to draw heavier lines for margins, section lining, shading, etc. If a heavy line is drawn at one stroke considerable ink will be deposited and, if the line is long, the amount of ink in the pen will often not be sufficient to complete the line. To avoid these objectionable possibilities the line may be built up of a number of finer lines drawn so they just lap, which may be easily done by moving the straight edge the desired amount each time. Fig. 4 is a full size reproduction of heavy lines built up with four strokes.

Fig 5 shows some margins which are suitable for working and illustrative drawings.

Fig. 6 shows the conventional breaks most often used. For long breaks the toothed line in the lowest illustration looks much neater than an irregular line. The teeth may be made with a 60 degree triangle, or freehand, as desired.

ENGINE GAS FROM PEAT.

The production of gas from peat having a low water content (up to about 20 per cent) for use in suction gas engines has already met with considerable success in Germany, but for a number of years efforts have been made to utilize peat with a water content as high as 50 to 60 per cent and thus eliminate the costly process of drying the raw material.

Difficulties have been encountered in preventing a loss of heat through radiation and other causes, and in getting rid of the dust and tar vapors carried over by the gases to the engine; but great strides have been made recently in overcoming these obstacles. Peat with a water content up to 60 per cent has been found to be a suitable fuel. Owing to its great porosity and low specific gravity it prevents a large combustion surface in the generator, so that the oxygen in the air used as a draft can easily unite with the carbon of the peat.

One of the great difficulties is to eliminate the tar vapors that clog up many of the working parts of the engine. The passing of the gas through the wet coke washers and dry sawdust cleansers does not appear to have thoroughly remedied the evil. Efforts were therefore made to remove the tar-forming particles of the gas in the generator itself or to render them harmless. That of the Aktien-Gesellschaft Gorlitzer Maschinenbau Anstalt und Eissengiesserei of Gorlitz, was displayed at the exposition at Posen in 1911. The gas from the generating plant was employed in a gas-suction engine of 300 horsepower used to drive a dynamo for developing the electric energy for the exposition. The fuel used was peat with a water content of about 40 per cent. The efficiency and economy results obtained were very promising.

The advantages claimed for the Gorlitz engine are that the sulphurous gases and those containing great quantities of tar products are drawn down by the suction of the engine through burning masses of peat and thus rid of their deleterious constituents. The air for combustion purposes is well heated before entering the combustion chamber, thereby producing economical results. It is claimed also that the gas produced by its system is so free from impurties that the cleaning and drying apparatus may be of the simplest kind.

The cost of the peat used (water content, 40 per cent) was $0.57 per metric ton (2,204.6 pounds). In two trials the consumption per kilowatt-hour obtained was 3.43 pounds for the first trial and 5.31 pounds for the second.

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PACIFIC LUMBERMAN, CONTRACTOR AND ELECTRICIAN

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A Demand for Wireless Equipment

The whole world has stood aghast the past ten days in hearing recited the horrors of the Titantic disaster. To those familiar with conditions off the coast of Newfoundland, the wonder is, not that one gigantic ship has met its fate, but that six to eight a year are not taken to a watery grave.

Careful students of the details of this catastrophe see in it many timely warnings. In addition to the horrible demonstration of the necessity for ocean-going vessels being equipped with enough life boats for all passengers, a crying need for better and more independent wireless equipment is also forcefully shown. Within recent years wireless messages and their brave operators have done more to alleviate the sufferings of the sea than any other factor. In the present instance all shudder in horror in contemplating the complete disaster, which would have followed had no wireless communication been possible.

The present agitation to establish at San Francisco the greatest wireless station in the world should receive sweeping commendation. A station should be constructed not only powerful enough to gather the world's progress in business affairs from the burden-laden ships of the Pacific, but its entuning should be so delicate that the low sobs of the trials and dangers of human suffering at sea can be delicately and accurately located.

The proposed site for this great wireless tower, which overlooks the Golden Gate, seems blessed with every physical endowment necessary in the successful installation of a project of this magnitude May it be the mission of San Francisco, the home of a people who have braved and successfully overcome one of the greatest calamities of history, to have this monument of human usefulness that its citizens may have the privilege of eternally dissipating their sympathy and human charity out over the ocean waves and even to the little isles of the sea, which, though unseen from her shores, are swept by the same powerful and at times cruel forces that beat against the Cliff House at her western boundary.

Electrical Scenting of Icebergs

It is said to be practically impossible to discern the approach of an iceberg in the dead of night, especially one having a sunken tongue extending some distance outward from the main body of ice. To this fact, the ill-fated Titantic bears silent and convincing testimony, though manned by a crew, the pick of England's foremost seamen.

Professor Barnes of McGill University, a careful and scientific student, has accomplished noteworthy results in application of his electrical microthermometer in the vicinity of icebergs. It is found that, since the temperature of ice is lower than the surrounding water, a definite thermal influence is felt for miles out to sea. The law governing the rise in temperature with distance from an iceberg, known as the temperature gradient, has been definitely and positively established by means of the delicate electrical device above mentioned, which accurately regis-

ters temperatures to 0.01 degrees Centigrade. With such a device the approach of an iceberg can be definitely registered seven miles out to sea. A full account of Professor Barnes' experiments are to be found in the issue of Nature of December 1, 1910.

Hitherto, scientific study without applications to human protection has engrossed the energies of those studying the laws of ice bodies. The appalling disaster now so freshly in our minds should indelibly impress upon us the necessity of installing on all ocean-going ships exposed to dangers of icebergs electrical thermal recording devices or some other automatic recorder, which may scientifically scent the approach of possible human disaster from floating bodies of ice.

Pensioning in Public Service Corporations

The wives and sweethearts of many employees of the Portland Railway, Light & Power Company recently received from B. S. Josselyn, president of that corporation, a sparkling ten-dollar gold piece. Upon inquiry as to the "wherefore and the why," it developed that the gift was sent as an appreciative token to all employees who had been with the corporation for five years or over.

The incident naturally brings to consciousness an interesting train of thoughts. The close inquiry into the affairs of public service corporations by the various regulating commissions leads to the suggestion that, along with the sinking funds being set aside for depreciation of material things, it is only just and equitable that funds be also laid aside for depreciation in the human life and activity of those devoting their energies to this phase of public service.

An eminent philosopher once said that there are three factors found in human experience which can positively be counted upon as coming to pass with certainty—death, taxes, and the due date of a note. A fourth may just as truly be mentioned—that of ultimate decreptitude or old age disability after years of faithful service. Ample provision for such a human contingency should certainly be made. The rates charged by the public service corporations are being so thoroughly investigated and such small margins allowed over and above a reasonable return on the capital involved, that a few years hence, when many of these faithful servants have reached the winter time of life, the restricted larder will not be sufficient for the executive officers to deal as generously with the pensioning of employes as they would otherwise.

Like the low death rate and the consequent deceiving nature of a new assessment insurance company, the expenditures of a newly organized public service corporation, in its pension account, is small for many years of its early existence. The unalterable decree of nature, however, must eventually exert itself.

The Pacific Coast executives of the Western Union Telegraph Company have recently received advices of the inauguration of a plan for the benefit of the 30,000 employes connected with that corporation throughout the United States. Those engineers who are connected with out great institutions of learning have been amply provided for in the establishment of the Carnegie Foundation Fund, but the great rank and file in our public service corporations piteously unprovided for, daily trace their outward flow of vital energies on the revolving disk of life. Though this penned line represents real pulsating life, not even the same fond provision is made for it as for the sister dials—the recording wattmeters, the voltmeters and the like, for a carefully guarded depreciation fund awaits with jealous provision the time when age shall slow down their regulated pace.

No sweeter thing can be pictured in human affairs than that of a bright sunny season of well-earned rest in the closing days of the winter of life to reward the faithful. For promotion of such protection, the public service commission should be ready to aid favorable corporation sentiment in every manner possible.

Assurance in Continuity of Service

In the development of the hydroelectric industry, it soon became apparent that unavoidable shut-downs in the mountains would bring loss of prestige, if not an immeasurable loss in patronage, to the enterprise. The tying-in with other hydroelectric properties into one synchronously pulsating network soon established the hydroelectric industry on a much firmer basis. Today the central station, equipped with the steam auxiliary in the busy centers of industry and with two or more hydroelectric stations operating in parallel, has little to fear in the way of interruption in service.

The Stockton plant of the Western States Gas & Electric Company, a description of which is found on another page of this Journal, illustrates advantages to be derived from a mesh-work of possible interconnections. Not only does the double high tension circuit of this installation link the system with its steam auxiliary into an efficient and pliable power supply, but the interconnections with the Pacific Gas & Electric Company, as well as the Sierra & San Francisco Power Company, are a guarantee for continuity of service enjoyed by few plants of its size.

The question of interlinking in one gigantic throbbing network the entire power lines up and down the Pacific Coast at once arises in ruminating upon the Stockton accomplishment. Already the Pacific Gas & Electric Company has at times tied in with the Northern California Power Company's lines, thus making a synchronous electrical impulse felt from Santa Cruz on the south to almost the confines of the great State of California on the north. A temporary barrier is met in connecting with the lines south of Tehachapi Pass or even with the San Joaquin Light & Power Company, for power is generated on 50 cycles by the three great companies to the south. To the northward, in Oregon and even into Washington there seems to be no such "confusion of tongues" to be anticipated and it is not beyond belief that the not far distant future may see these great pulsating systems beating in synchronism from one end of the coast to the other. Such an achievement would make hydroelectric power supply expressible alone in symbolic figures of the heavens, when we say continuity of service would become as "constant as the north-star."

PERSONALS.

H. D. Melone, who has electric lighting interests at Ukiah, was a recent San Francisco visitor.

Frank Brookfield and **Arthur Lockwood** of the Brookfield Glass Company are visiting the Pacific Coast trade.

E. O. Stoddard, vice-president and general manager of Chas. C. Moore & Co., spent last week in Seattle and the Northwest.

Alfred Peterson is at San Francisco, after spending the past year at San Diego in connection with the installation of electrical machinery.

George I. Kinney, manager of the Pacific Coast offices of the Fort Wayne Electric Works, recently returned to San Francisco after visiting the factories.

H. R. Tobey, of N. W. Halsey & Co., of New York, is at San Francisco looking over the electrical properties of the corporations which the firm have financed.

Wynn Meredith, of Sanderson & Porter, is in British Columbia on business connected with the engineering contracts of which his firm has the supervision.

Guy W. Talbot, president of the Pacific Power & Light Company of Portland, left on April 17 for a hurried trip to New York and will be absent about two weeks.

H. C. Goldrick, representing the Kellogg Switchboard & Supply Company on the Pacific Coast, has returned to San Francisco from Puget Sound and British Columbia.

Fred S. Myrtle, head of the publicity department of the Pacific Gas & Electric Company, visited the plants at Nevada City and Colgate, on an inspection tour, during the past week.

S. G. McMeen, president of the Mount Hood Railway, Light & Power Company, which was recently purchased by the Portland Railway, Light & Power Company, is at Chicago.

C. S. Walters of Walla Walla, heretofore general manager of the Walla Walla Valley Railway Company, has been made vice-president and general manager and will continue to reside in Walla Walla.

W. L. Goodwin, vice-president of the Pacific States Electric Company, has returned to San Francisco from Portland, where he found great interest in the coming N. E. L. A. convention at Seattle.

J. H. McGill, of the Crescent Manufacturing Company of Chicago and Valparaiso, Ind., manufacturers of electrical specialties, has been spending several weeks in California and is now at San Francisco.

J. B. Blair has joined the industrial department of the district office of the Westinghouse Electric & Manufacturing Company at San Francisco. He was formerly connected with the Seattle office of the company.

E. G. Williams, chief construction engineer of J. G. White & Co., has been inspecting the construction work on the Oakland & Antioch Railway during the past week. He recently inspected the Midway Gas Company's gas pipe-line work, on which he is using ditching machines.

D. F. McGee, chief engineer of the Pacific Power & Light Company, has been elected vice-president of the Hanford Irrigation & Power Company, an affiliated company, and will have charge of the operation and construction of the Hanford company, in addition to his other duties.

G. W. Canney, who is on the Coast organizing the Westinghouse Electric & Manufacturing Company's new service department, is now at Seattle. The new department amounts to a consolidation of the repair department and the erecting department into one organization. **Thomas Anderson,** who was formerly district erecting engineer, with headquarters at San Francisco, is now known as district superintendent of the service department.

H. T. Cory has returned to San Francisco after spending several weeks in the South in connection with emergency work for the Flood Commission of the State of Georgia. He is preparing complete plans for engineering work to prevent future flood damage from the Savannah River around the City of Augusta.

George R. Throop, of J. G. White & Co.'s staff, is at the head of the field party which went to Fresno during the past week to secure data for a valuation of the San Joaquin Light & Power Corporation's plant and properties. A valuation office has been established by the firm at Fresno for handling the work, which is expected to occupy about three months.

Francis S. Foote, Jr., a graduate of Columbia University's engineering schools, New York, has been appointed associate professor of railway engineering in the department of civil engineering, University of California; his appointment to take effect July 1, 1912. Mr. Foote is at present a member of the instructing staff of the school of railway engineering and administration at the University of Illinois.

A. S. Grenier, for the past two years connected with the Pacific Power & Light Company, Portland, in the capacity of vice-president, left on April 20th for New York, where he will become connected with the American Power & Light Company, which is interested in the Pacific Power & Light Company. Mr. Grenier is leaving for New York to become assistant to Mr. F. G. Sykes, who is now president of the American Power & Light Company and who formerly resided in Portland. As a result of Mr. Grenier's leaving, a number of changes have been announced in the organization of the Pacific Power & Light Company. **J. E. Davidson,** heretofore general manager, has been made vice-president and general manager, and **Lewis A. McArthur,** who has been for two years chief clerk to Guy W. Talbot, has been appointed assistant to the general manager. **George L. Myers** has been elected assistant secretary and assistant treasurer. All of these changes are effective immediately.

PACIFIC COAST TRIP AMERICAN ELECTRIC RAILWAY ASSOCIATON REPRESENTATIVES.

The executive committee of the American Electric Railway Association and representatives of the American Electric Railway Manufacturer's Association have left New York City for an extensive Pacific Coast trip. They will reach Los Angeles soon after the first of May, be at San Francisco May 8-12, Portland May 14-15, and Seattle May 16-17. Elaborate preparations are being made for their entertainment at each of these cities and every facility afforded for a complete investigation of the electric traction situation. The committee will meet the city officials and the various railroad commissions and endeavor to gain a better understanding of the local situation as well as to promote harmony. Those making the trip are T. N. McCarter, of Newark, N. J., president of the American Electric Railway Association and president of the Public Service Corporation of New Jersey. Gen. George H. Harris, of Louisville, Ky., prominently identified with traction and railway interests in the West; C. Loomis Allen, president of the Newport News & Old Point Railway & Electric Company; A. W. Brady, past president of the American Electric Railway Association and president of the Illinois Union Traction Company; James F. Shaw, director of the Boston & Worcester Street Railway Company; W. L. Cornwell, president of the Transportation Utilities Company, of New York; C. C. Pierce, of New York, secretary-treasurer of the American Electric Railway Association; Arthur Warren, representative of the committee of public relations of the American Electric Railway Association.

SAN FRANCISCO ELECTRICAL CONTRACTORS' NOTES.

Local contractors are figuring on a pole line for the town of Roseville, Placer County, Cal.

W. S. Hanbridge was in Los Angeles Tuesday and Wednesday on State Association business.

R. L. Boynton, of the Central Electric Company, made a flying trip to Los Angeles, Thursday and Friday.

The National Electric Company have signed up a job of wiring for the Land Estate, Mason and Stockton streets.

Plans are out for the electric work on the new Tivoli Theatre, on Eddy street near Mason. An old contractor remarked that this is one of the most perfect wiring plans for a theatre he has ever figured. It is estimated that the job will run $15,000. O'Brien & Werner are the architects.

A movement is on foot to form all of the specialty contractors in San Francisco into a central body for the purpose of protecting and advancing their interests. Frank Klimm, representing the plumbers, Jesse Steer, representing the plasterers, and W. S. Hanbridge representing the electrical contractors, have been appointed as a committee to arrange for the financing and organization. W. S. Scott has been selected as temporary secretary.

The Electrical Contractors' Association are working hard to advance and improve the condition of the electrical business, and they should have the membership and financial support of every electrical contractor in the State. They should have the moral support of every jobber, manufacturer and central station manager in the State. They are going to hold their third annual convention in San Jose during the third week of August. They want to entertain the entire electrical fraternity at that time to bring them all closer together, to be able to get their views and assistance in solving the troubles and worries which they encounter in daily life. They want you, Mr. Central Station Manager, to get the electrical contractors in your town around you and get acquainted and show them some of your troubles and work with them and let them work with you, so you can all present a solid front to the public on any electrical problem. They want you, Mr. Manufacturer and Mr. Jobber, to get your salesmen and representatives to feeling that the success of the contractor means your success; also have your representative say a kind word for the Contractors' Association wherever they can, for remember they are trying to spread the doctrine of doing business right at all times, and it is easier to reach them in a body than separately.

We all know that the most of the contractor's troubles are caused by a lack of business training. Don't lose sight of the fact that while you, gentlemen, were serving your apprenticeship in the business world, the contractors were working just as hard to develop the methods of installing the wiring to supply the apparatus which you handle today. That he has not advanced as far as you, at the business end, is not to his discredit, because he had to start in the primer class after mastering his own craft, and he has surely paid for his education.

That the present generation will bring out many contractors with good business ability we all agree. So why not all join hands in this glorious State of ours and make our slogan "The success of the California State Association of Electrical Contractors." Does not the success of the contractor mean more success to yourself? So, from now on let us lay to our oars and pull hard, "All together, all the time, for everything electrical," and by doing so and pulling together to make the contractors' convention a success, to bring the contractors, jobbers, manufacturers and central stations together for all times; you will have assisted the California State Association of Electrical Contractors in bringing about complete commercial co-operation.

NEW CATALOGUES.

Bulletin No. 4923 from the General Electric Company is an attractive illustrated treatise on Modern Electrical Equipment for Economic Production of Iron and Steel.

Three-wire direct current generators are described together with their principle of operation in a sixteen-page circular (1088) issued by the Westinghouse Electric & Manufacturing Company. Numerous views of applications together with diagrams of connections and views of the component parts are given.

"Train Lighting Lamps" is the title of a bulletin issued March 15th, 1912, by the Engineering Department of the National Electric Lamp Association which is sustained by certain works of the General Electric Company, covering the description, performance and economy of Mazda and Gem lamps in train lighting service.

The Crocker-Wheeler Company has issued an interesting and attractive catalogue on Electric Fans. The first electric fan put on the market was built by the Curtis & Crocker Company in 1886, the invention of S. S Wheeler, now president of the Crocker-Wheeler Company. Diagrams are given to show the greater air delivery of the latest Crocker-Wheeler fans.

The Chicago Fuse Manufacturing Company have issued their Catalog No. 26, covering complete line of "Union" fuse protecting materials. Particular attention is called to the additions made to their line of National electrical code fittings and high voltage fuses and blocks, also, their attitude on the question of refilled fuses. The tabulation and arrangement is exceedingly convenient for ready reference.

Multiple Unit Trains and HL Control is the title of an interesting circular (1522) issued by the railway and lighting department of the Westinghouse Electric & Manufacturing Company. Folder 4049, issued by the same company, covers type F carbon circuit-breakers. These breakers are intended for the protection of lighting circuits and small direct current motor installations, being used to combine the functions of fuse and switch.

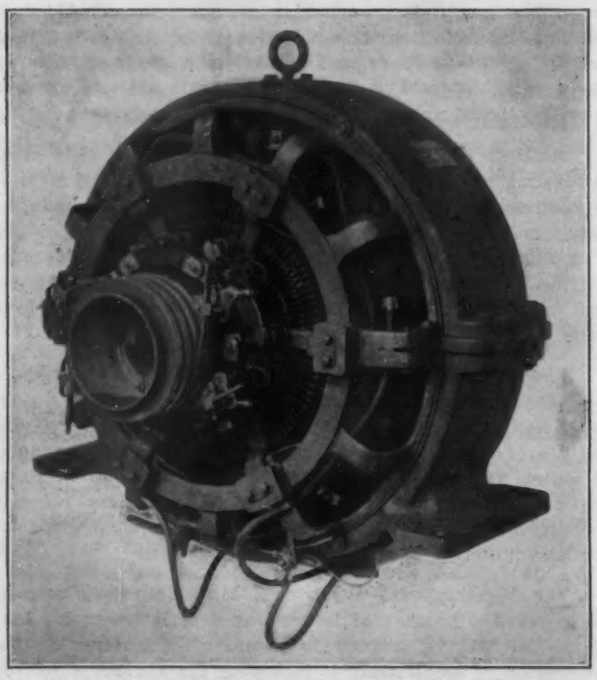
The Benjamin Electric Manufacturing Company have issued industrial lighting bulletin No. 10. In addition to the usual listing it includes several introductory pages covering the use of reflectors, design of illumination and the spacing of outlets to assist in making a lighting installation. Some of the more important new devices are the deep bowl reflector sockets, adjustolites, drop cord sockets and lamp grips for the prevention of loosening or falling lamps.

The Westinghouse Electric & Manufacturing Company have issued a number of interesting descriptive motor leaflets. No. 2441 is devoted to points of importance in the application of small motors, including the various questions of mounting, method of drive, and lubrication. No. 2443 gives performance curves of d. c. series wound and a.c. wound rotor. No. 2409 covers self-starting synchronous motors in capacity from 90 to 1500 horsepower, and from 200 to 6600 volts. Type CA alternating current motors, such as are used for operating washing machines, vacuum cleaners, food choppers, adding machines, sign flashers, house pumps, and similar applications, are described and illustrated in No. 2362. The type OK electrically operated brakes for direct current crane and hoist motors are described and illustrated in No. 2446. No. 2449 describes types 536 and 537 hand operated controllers for light crane and hoist service. These controllers are built in sizes from ½ to 7½ horsepower. Type SP electrically operated brakes designed especially for mill and crane service, built in sizes of from 5 to 200 horsepower are described in No. 2447. Westinghouse alternating current steel mill motors (type MA) are fully illustrated and described in No. 2383.

INDUSTRIAL

WESTINGHOUSE THREE-WIRE DIRECT CURRENT GENERATORS.

Three-wire systems for the distribution of electrical energy at low voltages, direct current, were developed during the pioneer period of the art of electric lighting. They have been and are now used extensively for energy distribution for light and power over short distances, principally because of the copper economies that they effect. Current is transmitted at twice the voltage of the lamps or the other apparatus connected between the neutral and one of the outside wires. The neutral wire carries only the unbalanced current, the value of which is determined by the difference in the loads on the two "side circuits" of the system. The transmission of current at twice the receiver voltage results in saving of copper cost, with a given energy loss in the line, of nearly two-thirds as compared with the copper cost of a two-wire system of a voltage equal to the lower of the two three-wire system voltages. The half voltages obtained from either side of the system is often convenient for variable speed motor



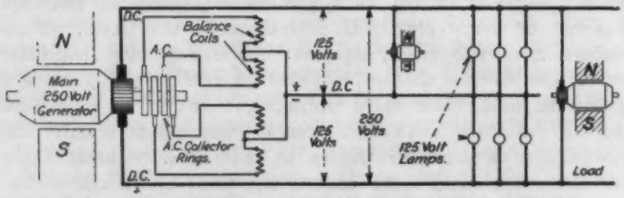
Westinghouse Type Q, Commutating Pole, Three-Wire Generator, Showing Collector Rings.

operation. Power consuming devices, motors especially, can also be connected across the higher of the two voltages.

The decided advantages of a self-contained three-wire machine for operating three-wire systems as well as the commercial and engineering advantages of a three-wire balanced voltage system many years ago induced the Westinghouse Company to develop a three-wire balanced voltage generator. The method is of interest at this time because of its recent application to modern commutating pole dynamos.

With the addition of certain parts, any regular Westinghouse single-voltage, direct current generator can be adapted to provide three-wire voltages. The Westinghouse three-wire system retains all of the essential advantageous characteristics of the ordinary three-wire system; in addition, it has the important advantage that only one machine is required. It utilizes a simple arrangement for obtaining inherently balanced three-wire systems. The principal difference between Westinghouse three-wire generators and standard, single-voltage, direct current machines is that, with the three-wire dynamo, auto-transformers or balance coils are added and certain connections to the balance coil windings are provided, as shown in the diagram.

The devices that convert the machine from a two-wire to a three-wire generator are so small that a Westinghouse three-wire generator is almost as compact as a two-wire machine of equivalent output. Collector rings are mounted at one end of the armature and the connecting leads to them are similar to those employed on the alternating current side of a rotary converter armature. The superiority of a three-wire generator, which is merely a standard two-wire machine with certain simple parts added to its armature, over a complicated arrangement involving special armature windings is apparent. Some types of three-wire generators have armatures with special windings imbedded therein under the usual winding. Such windings are difficult of access and are expensive to repair.



Connection Diagram of Westinghouse Three-Wire Generator.

The balance coil (sometimes called auto-transformer), is connected across each pair of two-phase collecting rings. This balance coil consists of a single winding on a laminated iron core, and is similar in mechanical construction to a distributing transformer. The assembled coils are contained in a cast iron case similar to those employed for transformers. The middle points of the balancing coils are interconnected, and from this connection the neutral lead of the three-wire system is brought out as shown in the diagram. The superiority of a stationary balance coil, that can be located in almost any convenient place adjacent to the generator, over a balance coil installed within and rotating with the generator armature, is apparent.

The performance of the Westinghouse three-wire generator is practically identical with that of a two-wire generator. The losses in the balance coils are so small as to be negligible. The inherent regulation of the machines is excellent. Standard three-wire generators are wound for 125-250. They may be compounded to impress an increasing voltage with an increasing load, as is the usual practice with single-voltage machines. It is customary to divide the series field turns into two parts, connecting one part in the positive and the other in the negative line lead in order that the regulation may be preserved at all loads. Commutating poles assure sparkless commutation from no load to heavy overloads.

The three-wire direct current system finds its application in the distribution of energy for light and power in office buildings, machine shops, stores, manufacturing establishments, and in all installations where the receiving apparatus is located within a mile or so of the generator.

Three-wire generators may be operated in parallel as satisfactorily as two-wire machines. The balance coils are connected directly to the collector rings, and the neutral wire is carried to the switchboard. It is therefore unnecessary

to synchronize or connect the alternating current sides of the armature in parellel; nor it is necessary to consider the frequency of the alternating currents generated in the armatures of the different machines. Three-wire generators can be operated in parallel irrespective of the number of poles and speed of each just as easily and simply as two-wire generators can be regulated for equal voltage. Two-wire and three-wire generators can be operated in parallel with each other and the latter will handle any unbalanced load.

In large stations with many units. it is, therefore, only necessary to operate one three-wire generator, provided it has sufficient capacity to carry the difference between the loads on the sides of the system. All of the other machines may be of the single-voltage type. It is, however, advisable to install duplicate three-wire units each of suficient capacity to provide for the maximum unbalanced condition of the system.

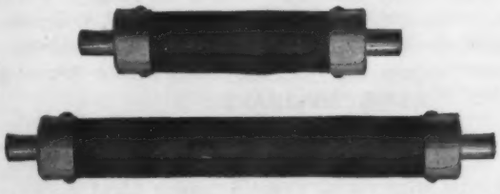
It is standard practice with the Westinghouse Company to furnish balance coils of sufficient capacity to properly care for a 10 per cent difference in load on the two sides of the generator; that is, for 10 per cent of full load current in the neutral wire. Balance coils can, when specially ordered, be provided for much greater unbalancing.

Westinghouse three-wire generators can be furnished in any capacity, type, or voltage that has been standardized for ordinary two-wire service. The only difference between the two-wire and three-wire generators is that collector rings, brush, gear and connections to the armature winding are added in the three-wire machines.

A NEW FUSE FOR POTENTIAL TRANSFORMERS.

The General Electric Company has placed on the market a potential fuse which will open the circuit successfully under excessive current conditions, when connected to systems of large capacity, with the action accompanying the blowing so slight as to be scarcely noticeable. There is no flame or other external disturbance. Because of this fact there is no danger to adjacent apparatus, and the fuse may consequently be located in any convenient position, near the switchboard or elsewhere, no cells or barriers being necessary.

In appearance this fuse resembles the ordinary type of enclosed fuse, the fuse proper being a small wire which passes through the center of the fibre tube which is 1½ in.



6600 and 15,000 Volt Potential Transformer Fuse.

in diameter. The wire is soldered at each end to the center of a metal cap, which is placed over the end of the tube. Surrounding the fuse wire is a filler which absorbs such a per cent of the arc, that the blowing of the fuse causes no external disturbance. The metal caps are provided with vent holes, so arranged that the filler will not leak out.

The performance under short circuit or with abnormal current on the line is independent of kilowatt capacity of the bus.

This fuse is intended primarily for use on instrument transformers. It can be furnished with special mountings to make it applicable to any use conforming with its voltage and ampere rating.

It is made for voltages up to 15,000 volts.

TRADE NOTES.

The Electric Appliance Company of San Francisco is moving its offices and salesrooms to 807 and 809 Mission street, where they have a six-story and basement building to accommodate their growing business.

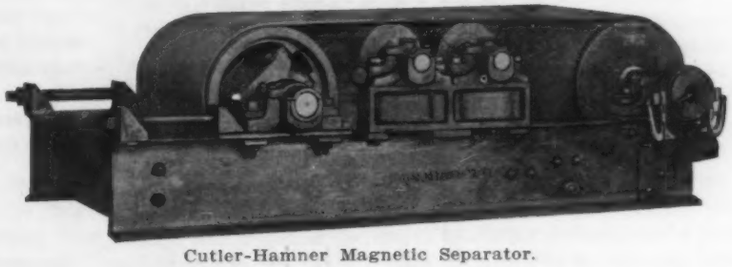
The General Electric Company has sold the Portland Railway, Light & Power Company a 7500-kw. turbo-generator rated as follows: One A.T.B. 2, 7500-kw. (9375 kva., .8 power factor), 1980 r.p.m., 5500 v., 3 phase, 33 cycle, horizontal Curtis turbine generating set. Also, under the same contract, an auto transformer as follows: One W.C.T., 5114 k.v.a, 11,000 v. primary, 5500 secondary.

In connection with the annual meeting of the League of California Municipalities at Berkeley, California, in September of this year, it has been suggested that all companies interested in street illumination prepare an exhibit of apparatus and equipment. This should appeal not only to the manufacturing companies but also to the electric companies supplying such service. Full details regarding the coming convention may be secured from the secretary of the League of California Municipalities in the Pacific Building, San Francisco.

The General Electric Company reports the following sales: To the Power Specialties Company, two small turbine generator sets, which are to be used for driving motors in two new municipal garbage disposal plants at San Francisco. Each set is described as follows: One 75 kw., 3300 r.p.m., non-condensing Curtis turbine, direct connected to one C. C. 4, 75 kw. 245-v, 250v. generator. To the Sierras Construction Company, San Bernardino, Cal., a 5000 kw. turbo generator set, as follows: One A. T. B. 4, 5000 kw., 1800 r.p.m., 6600v. generator, direct connected to one 5000 kw. horizontal, Curtis steam turbine. Also in the same contract, one 75 kw. Curtis turbo-generator exciter set operating at 3300 r.p.m. Also, a motor generator set, as follows: One D. L. C. 6, 100 kw., 900 r.p.m., 125-v. D.C. generator, mounted on a common base with and direct connected to one I. 8, 150 h.p., 44-v., 60 cycle, 3-phase, induction motor.

NEW HEAVY DUTY MAGNETIC SEPARATOR.

In many lines of manufacture it is very desirable to separate magnetic material from the non-magnetic. The cement industry is an example and the magnetic separator shown in the accompanying illustration has recently been in-



Cutler-Hamner Magnetic Separator.

stalled at the plant of the Southwestern Portland Cement Company, El Paso, Texas, for taking out stray iron, steel, etc., from the coal which is used in the kilns. This separator, built by the Cutler-Hammer Clutch Company of Milwaukee, is of somewhat special design. The pulleys are mounted on an I beam frame and because of the weight of the coal fed to the pulley, two idler pulleys are mounted between the wooden tail pulley and the magnetic pulley, which is at the right end. As the belt turns the coal is thrown to the front of the magnetic pulley and conveyed away, while the magnetic material is attracted and snapped off below, entirely separated from the coal. The current used for energizing the enclosed brass-jacketed coils brushes which are shown resting on the slip rings on the extension of the pulley shaft.

NEWS NOTES

INCORPORATIONS.

SEATTLE, WASH.—The promoters of the Seattle, Kenwood & Lake Forest Railroad have filed articles of incorporation. The line is to run between here and Bothell and Tolt.

COLFAX, WASH.—The Whitman County Consolidated Telephone & Telegraph Company of Colfax, $100,000, by G. T. Smith and E. J. Byrne.

LOS ANGELES, CAL.—The Lompoc Gas & Electric Company, $100,000, subscribed $3, by L. J. Christopher, J. B. Mullen and M. Gunsul.

VANCOUVER, WASH.—Articles of incorporation of the Independent Electric Company have been filed by H. G. Fleischhauer of Portland, H. K. Lugger of Vancouver and M. F. Brady of Portland. The capital stock placed at $50,000. Vancouver is the principal place of business. Its object is to operate and maintain the business of generating electricity for light and heating power to cities and towns in Washington.

SAN BERNARDINO, CAL.—Articles of incorporation have been filed for the Limited Mutual Water Company, with a capital stock of $20,000. The company is organized to supply water to the district bounded by San Bernardino avenue, West Fourth street, Mountain avenue and the south side of the right of way of the Santa Fe in the vicinity of Ontario. The directors are: J. W. Squire, C. W. Churchill and J. E. Burnham.

ANAHEIM, CAL.—Articles of incorporation of the Anaheim City and Interurban Railway Company will be filed for record in a few days, according to William Gerdes of South Los Angeles street, who is associated with Los Angeles and Eastern capitalists in construction of a network of interurban railways radiating from this city. The company will be incorporated for $500,000. Mr. Gerdes states that they intend to be operating cars on the line between Anaheim and Fullerton within a year after receiving franchises, which are to be asked through Fullerton, Orange and Santa Ana.

ILLUMINATION.

EL PASO, TEX.—A gas holder to cost $35,000 is to be erected at once by the El Paso Gas & Electricity Company, to have a capacity of 500,000 cubic feet.

LYNDEN, WASH.—An ordinance has been passed granting to the Lynden Mill & Light Company the right and authority to operate an electric plant for the generation, transmission, distribution and furnishing of light and power to the said town.

BURBANK, CAL.—Bids will be received up to May 25, for a franchise to build and construct, maintain and operate for a period of 40 years, an electric light and power system under and along the public streets, alleys, avenues and highways of the city of Burbank.

FAIRFIELD, CAL.—The Solano County Supervisors have granted a franchise to the Great Western Power Company. A resolution was passed to print authorizing the county clerk to advertise for a contract to furnish power in Solano County which would include a rate of 1c per kw. for the county buildings. Bids for such franchise are to be opened June 3.

VALLEJO, CAL.—A temporary franchise has been granted by the City Council to the Great Western Power Company to install power lines and supply electricity to the people of Vallejo. The company asked for a 35-year franchise. A $2000 check accompanied the application. The franchise as presented allows the commissioners the privilege of fixing the rates to be charged consumers. At the end of 35 years the city could purchase the equipment of the company. The application was placed on file.

SEATTLE, WASH.—Chairman George A. Lee, Jesse S. Jones and Harry E. Wilson, of the state public service commission, took testimony this week in connection with the commission's proposed gas, water and electric light rules. Forty representatives of various utilities in different parts of the State attended the hearing. Chairman Lee, commenting upon the hearing, said: "We have now had presented final objections to the commission's gas, water and electric light rules. These rules regulate the testing of meters, rendering of bills, the quality of gas, water and electricity, the question of advance payment of bills, deposits and other items of vital importance to the consumer. Machinery for testing gas, water and electric meters is required and fees therefor fixed. We believe that many causes of complaint against public srvice companies will be removed by these rules, and that better public service will be the direct outcome. Representatives of public service corporations who attended the hearing of the commission recently included the following named: A. B. Eilbeck, vice-president Spokane Gas & Fuel Company; M. L. Driscoll, city attorney, of Pasco; T. L. Keeley, Tacoma Water Supply Company; F. C. Farmer, Kitsap County Telephone Company, Bremerton and Port Angeles Telephone Company; F. C. Brewer, Bremerton & Charleston Light & Fuel Company, Grays Harbor Gas Company, Centralia & Chehalis Gas Company, Port Angeles Water Supply Company; A. M. Chitty, Puget Sound International Railway & Power Company, Everett; James E. Wickstrom, Shelton Electric Company and West Coast Power Company; J. S. Crilly, Blaine Water Company; E. R. Ramsey, Pittsburg Meter Company; C. C. Turley, Portland Railway, Light & Power Company; Victor H. Greisser, the Washington Water Power Company; George L. Raymond, Raymond Light & Water Company, Raymond, Wash.; M. Manly, White Salmon Water Company; L. M. Sims, Orchard Water Company, Kalama; C W. Hodgdon, Hoquiam; C. M. Fassett, commissioner public utilities, Spokane; Charles E. Shepard, president Light & Water Works, Montesano and South Bend; H. B. Zimmerman, Grays Harbor Railway & Light Company; J. S. Thornton, Twin City Electric Company, Raymond; Douglas Allmond, Anacortes Water Company; Wilbur B. Foshay, Washington-Oregon Corporation, an electric, gas, water, telephone and traction company; M. D. Spencer, Everett Gas Company, of Everett and Snohomish; J. E. Davidson, Pacific Power & Light Company, Portland.

TRANSMISSION.

LA GRANDE, ORE.—The Western Oregon Light & Power Company has been granted franchises by Elgin, Immler and Alicel, and will extend a line from here.

RIALTO, CAL.—Bids will be received up to May 21 for a franchise to erect and construct and operate for fifty years an electric pole, tower and wire system for transmitting electrical power along and upon all public roads, streets and alleys of the City of Rialto.

AUSTIN, TEX.—The Guadalupe Water Power Company of Seguin, Tex., recently formed with a capital stock of $600,000, will construct a series of dams and hydroelectric plants upon the Guadalupe River between that place and New Braunfels. The same interests are arranging to form a company for the purpose of constructing an interurban electric railway between Seguin and New Braunfels and between New Braunfels and San Antonio. The power of the hydro-

electric plants is to be used for operating the two railways and power transmission lines will also be constructed to San Antonio, New Braunfels, Seguin, San Morales and other towns in that section. The Guadalupe Power Company has already purchased the water power rights on the Guadalupe River and has surveys made for the six dams. It has expended already in preliminary work about $300,000.

OROVILLE, CAL.—Work has been started by the Great Western Power Company on its dam at Big Meadows. This work is to be completed by the first of the year. The Big Meadows will then constitute the largest artificial lake in the world. By the construction of this dam more than 55,000,000,000 cubic feet of water can be stored for power and irrigation. The company announces that it proposes to make five developments of power between Big Meadows and Oroville. This will necessitate the construction of four additional power plants at an investment of approximately $20,000,000. The total capacity of the plants will be 600,000 h.p. The Big Meadows reservoir will make available a supply of water sufficient to irrigate 500,000 acres of land. This water will be available for use at Oroville and will suffice for a tremendous addition to the orange and olive industry in Northern California.

LOS ANGELES, CAL.—In response to the appeal of E F. Scattergood, chief electrical engineer of the acqueduct power bureau, for immediate action and in accordance with the ideas of Mayor Alexander, the Board of Public Works has authorized preliminary steps to be taken relative to the installation of a municipal power distributing system. In a report to the board, Engineer Scattergood suggested that all companies having conduit or pipe lines in the streets of Los Angeles be required to file with the city engineer complete and accurate maps, giving a description and showing their location, and recommended that the city compile a set of composite maps on the scale of 25 feet to the inch, showing on each portion of these sectional maps all conduits and pipe lines accurately located. The board referred Scattergood's report to City Engineer Hamlin, with instructions to report what procedure should be followed and to submit an estimate as to what the cost will be to prepare such maps and plans as suggested. President Hubbard and Commissioner Humphreys of the board estimate that it will cost about $25,000 to prepare the maps and plans desired by the power bureau. Mayor Alexander has been under the impression a bond issue of about $5,000,000 will be necessary with which to establish the proposed municipal distributing system for power and electricity. He has suggested that this bond election might be held next December, without violating the contract with Speyer & Co., the New York bond firm.

TRANSPORTATION.

WEISER, IDAHO.—It is reported that the Southern Idaho Light, Heat & Power Company, owner of the interurban railways, out of Boise, will have its line completed from Caldwell to this place within another year.

EL PASO, TEX.—A bonus of $16,000 has been paid to Stone and Webster, owners of the El Paso Electric Railway Company, to insure building of a street car line on Stanton street, between the Boulevard and San Antonio street.

MEZA, ARIZ.—At the election for determining whether a franchise should be granted the Salt River Railroad, 72 votes were cast in favor of the franchise and 55 against. This means work will commence at once as the company has promised to have cars running within eighteen months.

SAN DIEGO, CAL.—G. W. Pursell, promoter of the San Diego, El Cajon & Escondido Railroad, has sounded the City Council for extension of his franchise. Operation of cars originally was to begin June 1, which is considered an impossibility. Actual construction will be resumed within thirty days, it is said, and city lines will be hurried to completion. It is probable the extension will be granted the Los Angeles, Riverside & San Diego Railroad, as successors to the old company.

SAN BERNARDINO, CAL.—A franchise for an electric railroad to extend from the city limits along Rialto avenue to the Southern Pacific station has been asked for by the Pacific Electric Railway, and the City Council has ordered a call for bids. The franchise is for both freight and passenger service and covers a period of 50 years.

ANTIOCH, CAL.—A corps of engineers for the Oakland, Antioch & Eastern Electric Railroad have been at work here for several days surveying along the main street. Although the men have been engaged in running lines between this place and Pittsburg for some time, this is their first appearance within the corporate limits for several months. It is believed that the company will ask for a franchise through the city in the near future. There is strong indication that the road from Antioch to Bay Point will be constructed this summer.

AUBURN, CAL.—G. B. Herrington, who built the Mountain Quarries Railroad from this place to the Mountain Quarries Company's quarry, on the American River, is canvassing among the citizens and business men of Auburn, with a view to get them to subscribe the necessary capital to build and equip a line of electric street railway in this city. Mr. Herrington says that if the money needed, $30,000, is subscribed by the people of Auburn, a company will be formed and a franchise asked for, and as soon as possible construction work will be commenced. The proposed line will run from Aeolia Heights on the eastern limits of the city to the new Southern Pacific depot on Nevada street and will pass all the hotels, principal business houses, the opera house and churches and the courthouse, and the entire length of the road would be nearly two miles. It is proposed to have a high power car make regular trips at 20 minutes interval, from one end of the town to the other, over the principal streets, and meeting all passenger trains at both depots.

TELEPHONE AND TELEGRAPH.

LAPWAI, IDAHO.—The Pacific States Telephone Company has asked for a franchise and will expend $5000 in installing their system here.

KLAMATH FALLS, ORE.—The Pacific Telephone & Telegraph Company is soon to begin the construction of a new telephone system for this place.

HOLLISTER, CAL.—Messrs. Fox & Zimmer of the San Benito oil fields state that the oil company will construct a telephone line from Section 5 to King City.

SANGER, CAL.—The Board of Trustees passed an ordinance granting a franchise to the Sanger Telephone Company to construct and operate a system of masts or poles and wires for the transmission of electricity for telephone purposes in Sanger.

SEATTLE, WASH.—In the case of the Puget Sound Independent Telephone Company against the Pacific and other companies, where certain long distance connections and rates were sought, the parties have reached a compromise which will give Snohomish, Skagit and Whatcom counties long distance service to Seattle and Tacoma. This agreement was made subject to the approval of the commission and fully satisfies the complaint.

TACOMA, WASH.—Mayor Seymour is desirous that Tacoma shall own its telephone system after the Pacific Telephone franchise expires three years hence. Last December the Home and the Pacific systems consolidated. Two weeks

ago Mayor Seymour and the city commission revoked the Home Telephone franchise, allowing the company 60 days to remove the wires and poles and transfer the conduits to the city. The company has taken no action. Under the Mayor's instructions, the city attorney prepared papers for quo warranto proceedings against the Pacific company to compel them to cease the maintenance of the Home company's lines and to remove its poles. The revocation of the Home franchise is based chiefly on the discontinuance of the automatic service which it called for. The city's chief aim is to completely nullify the Home franchise so that the Pacific Telephone Company cannot operate under it after 1915.

OLYMPIA, WASH.—That there is a big difference between the figures of the company and of the State's experts in regard to the cost of telephone service in Olympia; that the company had two sets of contracts; that the cost of telephones in Olympia increased in 1911, compared with 1910, while in the country there was a decrease, were some of the things developed at the hearing before the Public Service Commission on the complaint of the Farmers' Telephone Company of Thurston county against the Pacific Telephone & Telegraph Company of Olympia. The rural company charges that the Bell company is acting in an unreasonable manner in increasing its rates from $3.60 a year for each rural telephone to $7.20. The Bell company's agents asserted that the cost per station of operating in Olympia is $9.12 annually. A. R. Kelly, telephone expert for the Commission, testified that an examination of the company's books in San Francisco showed that in Olympia in 1910 the cost was $6.36 per station and in 1911 had increased to $7.48. On the other hand, he testified that the cost per station for the farmers' telephones was $4.19 in 1910 and only $4.06 in 1911.

SAN FRANCISCO, CAL.—The Postal Telegraph Company has filed a complaint with the State Railroad Commission against the Pacific Telephone & Telegraph Company and the Western Union Telegraph Company. The complaint was informal and was contained in a letter to the Commission from W. Hearn, local manager of the Postal. The protest charges discrimination. It is set forth that the telephone company has been in the habit of switching calls for the Postal to the Western Union. The complaint says that on March 15 a series of tests was made in San Francisco, Berkeley, Sacramento and Fresno. It is declared that after calling for the Postal company the subscribers were connected with the Western Union. The Pacific Telephone Company and Western Union have an arrangement by which a subscriber calling for "telegram" is connected with the Western Union. The Postal company asks that the telephone company be directed to change this system, to the end that when the subscriber calls "telegram" the central operator must ask the subscriber whether he wants Western Union or Postal. The Pacific Telephone Company nas been called upon by the Commission to reply.

SAN FRANCISCO, CAL.—The State Railroad Commission has notified the Pacific States Telephone & Telegraph Company that it must correct immediately all inequalities in its rates. The board also demanded withdrawal of certain rate advances made late in 1911. Since the date on which the constitutional amendment relative to the State control of public utilities went into effect, the telephone company announced certain reductions in rates in and about Hollister, Stockton and other cities. In the main, these reductions were said to amount to discrimination against new subscribers in favor of the old. A new general rate for new subscribers was established, and at the same time old subscribers were given a rate lower than the general. Under the public utility act, the company had no right to make these advances or reductions without applying for the Railroad Commission's permission. A hearing recently, at which the Pacific States was represented by E. S. Pillsbury, resulted in the Commission ordering the telephone company to cease the overcharges at once, iron out all inequalities and, at the same time, file with the Commission a copy of all its tariffs. It has already filed a general schedule of rates, but not one by which the Commission could discern the difference between the metropolitan, general and suburban rates, or compare the differences.

LOS ANGELES, CAL.—The long fight which the city of Pomona, aided by Los Angeles and Pasadena, has waged against the Sunset Telephone & Telegraph Company for the municipality ended when the United States Supreme Court reversed the decision of the United States Appellate Court and declared that a municipality has the right to charge a corporation for the privilege of doing business in the community. All claims that a corporation such as the Sunset has the right to do business in the city because it operates a telegraph line which is subject to government use in time of war, fall flat, according to the decision of the Supreme Court of the United States. A corporation doing business in a city must take out a franchise in order to use the public streets for the purpose of stringing wires, laying gas mains or running street cars. Also the municipality has the right to charge the company a certain per cent of the net income for the privilege of such a franchise. The decision of the Supreme Court of the United States is of the utmost importance to California as well as the rest of the United States. There is no doubt but that the opinion handed down will mark a precedent in the legal procedure of the country, for there are suits in nearly all parts of the country in which corporations are seeking to avoid paying municipalities for using the city streets and public thoroughfares. The fight to force the Sunset Telephone & Telegraph Company to take out a franchise started ten years ago.

WATERWORKS.

BRIGHAM CITY, UTAH.—The $35,000 bond issue for the construction of waterworks carried by a large majority at the election recently held.

MONMOUTH, ORE.—Bids will be received up to the 4th day of May for furnishing the material and labor and constructing a system of waterworks for this city.

WAPATO, WASH.—Bids will be received up to the 8th of May for the furnishing of all material and labor necessary for the construction of the distributing system of the municipal waterworks.

LOS ANGELES, CAL.—The City Council has referred to its water committee the recommendations of City Attorney Shenk for immediate installation of an adequate water service at Terminal Island.

MODESTO, CAL.—The plans and specifications of the proposed water system have been adopted and placed on file and the appointment of F. C. Roberts and E. H. Denicks as supervising engineers confirmed.

SEATTLE, WASH.—A special election has been called for April 27th to vote on the construction of a new water system, to be owned by the city. Water will be brought from Deer creek, one mile west, by gravity.

PECOS, TEX.—It is proposed to have a special bill passed at the next legislature allowing Pecos to issue special municipal bonds for the purpose of constructing a waterworks system to cost about $90,000. Water is to be carried a distance of 14 miles.

BAY CITY, ORE.—Bay City is to have a new water system during the coming summer. Plans are now being drawn by the Bay City Land Company to replace the entire plant. Six-inch mains will be laid in the business district. It is estimated that $5000 will be spent on the system.